AGRICULTURE IN THE MIDDLE EAST AND NORTH AFRICA.

Research Systems, Needs and Priorities.

A Critical Assessment.

by
Dr. Subhi Qasem

December 1986

A Study Supported by IDRC Regional Office
for the Middle East & North Africa, Cairo

122.

Agriculture in the Middle East and North Africa: Research Systems, Needs and Priorities . A Criminal Assessment

Old evaluation report number was 3.5.4

-CONTENTS-

-TEXT TABLES-

-LIST OF ANNEXES-

I. SOCIAL AND ECONOMIC INDICATORS

1. Population and Manpower.

1.1 Present and projected population: The total population of Arab countries in 1984 came to almost 185 millions. The population of individual countries, rate of growth and projected population for the years 1990, 1995 and 2000 are shown in Annex(1). The Arab countries have one of the highest rates of population growth in the world. Based on past and present trends, social and political considerations, the United Nations report on world population prospects projected an average of 2.9 per cent of annual growth in population for the group of Arab countries. This means that the population of Arab countries will reach 290 millions by the year 2000. This means also that an additional one hundred million people would have to be fed by the year 2000.

1.2 Demographic features of population: Another feature that is characteristic of Arab population, is the high percentage of dependents falling in the age group of zero to 14 years of age.

In 1984 population in working age (15-64) as per cent of total population came to:

- 48-53 in:Algeria, Morocco, Mauritania, Libya, Sudan,Somalia, Jordan, Syria, Iraq, Oman and the two Yemens.
- 54 to 59: Saudi Arabia, Kuwait, Tunisia and Egypt.
- 60 to 67: Bahrain, Qatar and U.A Emirates.

The high per cent of working age in some oil countries is perhaps a result of high number of adults who were given citizenship in recent years. What is worth noticing here is that the

high percentage of dependents in the age group of zero to 14 that persisted in the population since 1965 (see Annex 2). The projected distribution of age group zero to 14 in the year 2000 comes to average of 50 per cent in the Arab countrie (Annex 3). Compared to per cent of population in working age of other countries, the picture is as follows:

	Per cent of population in working age(15 - 64)
-Average Arab ountries	50
-United States	65
-West Germany	69
-USSR	66

1.3 Urban and rural population: One of the main features of developed societies is the dramatic increase in urban centers resulting from migration of people from rural to urban areas. The Arab Countries are not an exception; over a period of 20 years (1965-1984), the major changes that took place were as follows

Urban population in 1984 as per cent of total population	Countries
19 to 33	-Yemen & AR, Oman, Somalia 21, Egypt Mauritania
37 to 55	-Yemen Dem.,Syria, Tunisia, Morocco, Algeria
70 to 93	-Saudi Arabia, U.A.Emirates, Kuwait, Iraq, Jordan

Increase of urban population in 1984 over 1965 (%)	Countries
Less than 20	-Egypt
20 to 50	-Yemen Dem.,Kuwait, Iraq, UA.Emirates, Syria,Tunisia, Morocco, Algeria
51 to 65	-Jordan, Somalia, Sudan,
84	-Saudi Arabia
100 to 600	-Yemen AR, Oman, Libya, Mauritania

The distribution and changes that took place in urban population for individual countries are shown in Annex (4).

1.4 Labour force:Labour force working in agriculture and other sectors in individual countries is shown in Annex(2). In all Arab countries, labour force working in agriculture has decreased over the period 1965 to 1980. The decrease should not be looked at in a negative context. It is only when the agricultural sector is suffering from labour migrating to other sectors, that constraints should be studied.

2. General Development Indicators

2.1 Gross national production (GNP) and gross domestic production (GNP): The total GNP's of all Arab countries in 1984 came to 4110.3 millions US Dollars. The total GDP's for the same year was 393.1 millions. This shows that some Arab countries earned from sources outside their domestic ones, a total of 23.2 billions.
The sources of such income are usually income remittances of labour working outside the country, grants and interests

of national investments abroad. The distribution of GNP,GDP, per capita income and shares of production sectors in the GDP by country are shown in Annex(5). Some analysis of the data for GNP and GDP shows the following:

a- Total GNP's of all Arab countries for 1984 make up only 79 per cent of the GNP of a country like France whose population came to 54.9 millions.

b- The GNP's of six oil-exporting countries; namely Algeria, Libya, Iraq, Saudi Arabia, Kuwait and U.A Emirates, make up 72.45 per cent of GNP's of all 21 Arab countries. (see below). Population of the same countries make only 29 per cent of total population of Arab countries.

Country	GNP (millions US $)	Per cent of GNP of total GNP for all Arab countries (total GNP= mills.US$ 461,280)
- Algeria	51,092	12.27
- Iraq	46,886	11.26
- Libya	29,820	7.16
- Saudi Arabia	116,883	28.08
- Kuwait	28,424	6.83
- UA Emirates	28,496	6.85
Total	301,601	72.45

c- With the exception of Syria, per capita income is lowest in countries in which share of agriculture in GDP is highest (17 per cent or above, see below).

Country	Per capita income (US. $)	Per cent share of agriculture in GDP
-Somalia	260	50
-Sudan	360	33
-Mauritania	450	34
-Yemen AR	550	24
-Morocco	670	17
-Egypt	720	20
Average for all Arab countries	2253	

It is worth mentioning that per capita income of these seven Arab countries falls among the lowest 30 per cent of the total number of the countries in the world.

d- The place of agriculture in generating income in the various economies ranges from one per cent to 50 per cent of total GDP. The Arab countries, with regard to per cent agricultural share in GDP may be grouped as follows:

Per cent of agricultural share of GDP	Countries
1	-UA Emirates, Qatar, Kuwait, Bahrain
2-5	-Saudi Arabia, Libya, Oman, Djibouti
6-10	-Algeria, Lebanon, Jordan, Iraq, Yemen Democratic.
15 to 20	-Syria, Tunisia, Egypt, Morocco
24	-Yemen Arab Republic
30-35	-Sudan, Mauritania
50 or above	-Somalia

All Arab countries, in which agricultural share of GDP is 5 per cent or less, except Djibouti, are oil-exporting countries. Furthermore, all these countries are arid or desert countries, and hence agricultural production is linked with how much water may be made available. The other groups of Arab countries have diversified economies in which agriculture constitutes higher potential. An exception perhaps is the Yemen Democratic, which is poor both in GDP and agricultural potential.

e- A number of Arab countries has a higher GNP than GDP. The picture is as follows:

Country	Millions US.$		Per cent of	Main source of outsi
	GNP	GDP	GDP to GNP	income
-Sudan	7668	6768	88	Manpower working out side & grants
-Yemen AR.	4290	2940	68	Manpower working Outside & grants
-Egypt	33048	30060	91	Manpower working outside & grants
-Tunisia	8890	6940	78	Manpower working outside & grants
-Jordan	5338	3490	65	Manpower working outside & grants
-Kuwait	28424	21710	76	Outside investments

This picture may change in the future because:

- Less and less manpower is continuing to work in other oil-exporting countries because of the decrease in oil prices and slower economies.

- Less and less income will be generated from outside investments because of the decrease in oil prices in oil-exporting countries.

2.2 Annual growth of production sectors:During the ten year period 1973-84, the average annual growth rate of GDP in the Arab countries ranged from 1.5 in a country like Kuwait to 9.6 in Jordan. The growth rates in GDP, the agricultural sector, industry and services for individual countries are shown in Annex(6). During the twenty year period 1965-84, growth rates in industry and services were higher than those in the agricultural sectos. The picture for countries with substantial agricultural sector was as follows:

Country	Per cent average annual growth rates: 1965-73			1973-84		
	Agric.	Indust.	Services	Agric.	Indust.	Service
-Algeria	2.4	9.1	5.3	4.2	6.3	7.0
-Morocco	4.8	5.4	6.1	0.6	3.7	5.8
-Tunisia	6.6	8.6	6.0	1.9	6.8	5.9
-Egypt	2.6	3.8	4.7	2.5	10.3	10.6
-Sudan	0.3	1.0	0.5	2.7	6.4	7.5
-Syria	-0.7	14.9	5.7	6.8	4.5	8.3
-Yemen AR.	-	-	-	1.8	13.8	9.6
-Iraq	-	-	-	1.7	4.8	5.1

Notable features of growth rates in above figures are the following:

a- Growth rates in the agriculture sector have slowed down as years went by in countries like Morocco, Tunisia and Egypt.

b- The substantial increase in growth rates of the agricultural sector in countries like Syria and Sudan over the years, were the result of horizontal expansion of land under cultivation. More lands were put under cultivation through new irrigation schemes, which were developed in the late seventies in both countries.

c- The fact that growth rates of industry and services were higher than of those in agriculture, suggests that governments gave less priority to agriculture.

d- The fact that agriculture did not develop as fast as other sectors, suggests that thorough analysis of the sectors should be carried out to point out constraints involved. Evidence suggests that growth has resulted more from horizontal expansion of cropped land than from vertical increase in productivity (see later chapter on production and productivity in agriculture).

2.3 Development of oil revenues: Revenues in oil in the major oil-exporting countries has increased almost four folds from the year 1975 to 1980. The increase came as a result of amount produced and exported, as well as of big jumps in oil prices. The revenues in 1983 decreased to almost 50 per cent of that in 1980 (see figures below). The drop in revenues was more a result of decrease in oil prices than in quantities produced. It is important to note the fragility of GDP of these countries because of its heavy dependence on oil exports. In 1980, revenues of oil constituted more than 70 per cent of GDP in 1983. However, the share of oil revenues in GDP remained high, but went down to less than

50 per cent in the majority of countries. The lesson learned from this, is that Arab countries must develop a more stable and diversified base for its GDP. The most promising nominated sector to be developed in countries like Iraq and Algeria is agriculture. The other countries may choose to diversify production and revenues from a mixture of sources. Such sources may include industry, investment in agriculture in other Arab countries, domestic agricultural production in countries like Libya and Saudi Arabia, and investment in production projects inside and outside the Arab region

Country	Development of oil revenues over the period 1972-83 (bills. US.$)					
	1972	1975	1979	1080	1982	1983
-Saudi Arabia	2.8	25.7	57.5	102.5	75.8	51.5
-Kuwait	1.4	7.5	16.9	17.3	8.2	11.3
-U.A Emirates	0.6	6.0	12.9	19.5	15.5	12.2
-Qatar	0.3	1.7	3.6	5.4	4.0	3.0
-Libya	1.6	5.1	15.2	22.6	14.0	11.3
-Iraq	0.7	7.5	21.3	26.2	10.1	8.8
-Algeria	0.6	3.4	7.5	11.4	11.6	6.0
Total	8.0	56.9	134.9	204.9	139.2	104.4

2.4 Pricing policies: Pricing policy is one of the important elements in the overall system of agricultural production. Pricing policies may be used as an instrument to:

- promote production of certain commodities or vice versa;
- ensure adequate income to farmers to stay in farming;
- ensure profits to farmers so that they can adopt new technologies. Adoption of new technologies usually lead to higher productivity . The end result will be prosperous farmers and more production.

We'll attempt in the following paragraphs to summarize pricing policies of various Arab countries, and how they have affected production and productivity.

2.4.1 Pricing policies of basic food commodities: These include cereals especially wheat, red meat, milk and milk products, rice, oils and fats.

In the late sixties and early seventies, most Arab countries adopted the policy of price control of the above mentioned basic commodities. The common feature of all policies in the begining was to determine production costs of a particular commodity, add a small margin of profit to farmers, and fix prices at the reached levels. In most cases, prices were controlled with little consideration to international markets. Many studies revealed that prices declared by governments were in favour of the consumer at the expense of the producer i.e. the farmer. As most of domestic production started falling short of meeting consumptive needs, the governments resorted to importation. If imported commodities were higher than controlled prices, the governments would resort to commodity subsidy. Thus, subsidy of commodities sold to consumer like wheat, red meat, milk, rice and oils became a feature of the food policy in countries like Egypt, Tunisia, Jordan, Algeria, Morocco Libya, Iraq and Sudan. As international prices fluctuated up and down, controlled prices in Arab countries did not change accordingly. In mid-seventies, for example, prices of wheat in the international market rose to more than 250 U.S Dollars per ton. Domestic prices in Arab countries remained low, and hence farmers had to comply with controlled prices that were much lower than international prices. While prices of food commodities were fixed or controlled, prices of production inputs increased in the international market as well as in the Arab domestic markets. Furthermore, inflation affected most other commodities needed by farmers like clothing, farm machinary, housing, transportation and other services. As time went on, farmers either shifted to production of commodities that were less affected by pricing policies

of the government or to those that were not affected at all. Parallel to these developments, many Arab countries were able to reclaim sizable areas of land especially those under irrigation. Notable among these countries are, Algeria, Iraq, Morocco, Sudan, Syria and the Yemen Democratic. Crops cultivated in the newly-reclaimed lands were fully controlled by the government concerned. The crop was either an industrial crop like peanut and cotton for export, like in the case of Sudan, or a basic food commodity needed to decrease imports and increase self-sufficiency. Among these crops were sugar beet and wheat as in the case of Algeria,Iraq, Morocco and Syria . Furthermore, much of these lands remained owned by the government and farmers were allowed to work as share-croppers with the government. In most cases, farmers were not satisfied with the arrangement because prices of the produced commodities were controlled by the government. What made matters worse, was the fact that productivity in these lands remained low (see changes in productivity in coming chapter). As time went on, some governments began to learn by experience and results. At the same time production as well as productivity remained low. Farmers controlling their land were negativelly responding to price policies of the government. More and more farmers preferred to produce commodities whose prices were not controlled by the government. One country after another started reviewing their pricing policies. Among the first to learn from past lessons was Jordan. In late seventies, the Government of Jordan raised the price of domestically-produced wheat to 60 Jordanian Dinars(JD) per ton. Price of wheat offered to mills was fixed at that time at JD 38 per ton. The response of farmers to the Government move was slow,and the Government kept on raising the price as years went by. The current price(1986) of the locally-produced wheat is JD 120, which is equivalent to US$ 340 per ton. As things stand now, several farmers and investors have started entertaining the idea of wheat production. What is assuring to farmers is that the Government has declared the prices to stay at the new level for the next five years regardless of the world market prices.

Many people are skeptical about the Saudi Arabian experience in the promotion of wheat production. In early eighties, the Saudi Government subsidized fertilizers used in wheat production by 50 per cent of the price, gave soft loans to irrigation equipments and declared to buy wheat at the price of US$ 450 per ton. The farmers used the latest technology available in water application (pivot sprinklers), improved seeds, weed control and fertilization regimes. Productivity of wheat jumped from less than one ton per hectare in the seventies,to a national average of more than three tons per hectare in 1984. Several countries including Iraq, Tunisia,the Yemen Democratic and Algeria have taken measures that provide incentives to producers of basic food commodities. The general features of these policies are as follows:

a- Provisions to offer services on cooperative basis aimed at reduction of costs of production inputs. Such inputs include providing improved seeds, fertilizers at prices lower than international market, soft loans, other ploughing services at moderate prices, chemical weed control services and mechanical harvesting.

b- Provisions to offer farm gate prices that ensure a reasonable margin of profit to farmers.

c- Provisions to discourage farmers to produce vegetables,or to limit the cultivation of certain vegetables (like tomatoes as in the case of Jordan).

In spite of these measures that appear to be positive, there persists some constraints that decrease the effectiveness of the positive aspect of pricing policies. These constraints include the following:

a- Pricing policies are not inclusive to all commodities.Therefore, the effects of such policies have not been consistent with objectives.

b- Prices fixed by governments have not always been based on fair determination of prices of production inputs.

c- Prices that are supposed to promote production of a certain commodity are declared after planting date.

d- Bureaucratic procedures applied by governments when purchasing commodities from farmers have dicouraged farmers, and thus decreased the positive effects of incentives.

e- Pricing policies are not coupled with any insurance to farmers from unfavourable weather conditions like drought.

f- Bureaucratic procedures, applied by governments in the ditribution of production inputs at prices lower than the free market, have lowered farmers response to such incentives. Production inputs supplied in this arrangement constitute 25 to 50 per cent of farmers needs in several countries.

2.4.2 Pricing policies of fruits and vegetables: In the majority of Arab countries, prices of fruits and vegetables have been left to the forces of supply and demand. Few exceptions are in Iraq and UA.Emirates, where farmers are guaranteed a minimum price for some vegetables and fruits. On the whole, the situation in terms of supply of these commodities from national sources to meet domestic demand have been satisfactory in the majority of Arab countries. Export of such commodities, as in the case of citrus fruits in Morocco, onions in Egypt, tomatoes and cucurbits in Jordan, apples and grapes in Lebanon, are being carried out successfully. The governments interferences in the production and export in these countries have been minimal. When such interferences are present, they are there to help facilitate better environment for export. In reviewing production systems of fruits

and vegetables, one finds many positive relationships. These include:

a- The level of technology used in the production of these commodities is much higher than that of other basic foods like cereals.

b- Productivity levels of the majority of fruits and vegetables is relatively much higher than other crops, and compare favourably with international levels.

c- The degree of self-sufficiency in all Arab countries is highest in the case of fruits and vegetables.

d- There seems to be a more positive relationship between farmers as clients of know how and technology on one hand, and the national research system or trade companies dealing with technological inputs on the other.

2.5 Land holding patterns: Except for Sudan and Yemen Democratic, most agricultural land is owned by farmers in all other Arab countries. Newly-reclaimed projects in Syria and Iraq were owned by the government. However, in 1985, Iraq decided to distribute newly reclaimed lands to farmers. In both countries , land owned by the government does not constitute more than 5 per cent of the total in Iraq and 10 per cent in Syria. In Algeria, a special situation existed until 1984. Land that used to be owned by the French colonials was taken over by the Government. Land was then given to "workers" in a program called "automanagement". Under this system "workers" previously connected with the land under French rule were allowed to farm the land under special arrangement, in which farmers will be share-holders with the government. The situation has

changed since 1985, where more permenant relationship between the land and farmers was established. It is not the objective of this paragraph to discuss the social and political aspects of private and government ownership of land. On the whole, all Arab governments with the exception of those of Sudan and the Yemen Democratic, recognize the right of citizens to own land.

Over the years several land reform measures were taken in Egypt,Iraq, Syria and Libya. These measures aimed at limiting large land holdings. The distribution of agricultural land holdings by number in Arab countries are as follows:

Country	Year of information	Total area (1000 hectare)	Number of land holdings (1000)	Number of landless worki in land (1000
-Algeria	1973	5464	710	165
-Egypt	1982	2329	3655	-
-Iraq	1979	6279	470	-
-Jordan	1983	362	57	-
-Kuwait	1979	3	0.5	-
-Libya	1974	2011	143	-
-Morocco	1983	7952	1399	450
-Oman	1979	83	83	-
-Qatar	1982	9	0.7	-
-Saudi Arabia	1979	1477	203	-
-Syria	1970	4720	469	-
-Tunisia	1980	5083	355	-
-UA.Emirates	1982	26	12	-
-Yemen AR.	1982	1350	591	-
Total		37150	8148.2	615

The distribution of land holdings by size is more significant. The picture is as follows:

(Size:hectare)

Country	Per cent distribution of some sizes of land holding			Percentage distribution of land holding by size		
	One or less	Two or less	Five or less	Ten or less	11-200	More than 200
-Algeria	22	35	60	78.5	21.4	0.1
-Egypt	-	95	3	100	-	-
-Iraq	-	25	43	75	24.3	0.7
-Jordan	-	-	-	-	-	-
-Libya	-	-	46	67	33.5	0.5
-Morocco	30	47	68	89	11	-
-Saudi Arabia	6	13	33	61	38.6	0.4
-Syria	16	30	55	72	27.6	0.4
-Tunisia	-	-	42	64	36	-
-Yemen AR.	57	71	88	96	4	-

In looking at above figures, one can see clearly the problem of small size land holdings in all the countries. In some countries, small land holdings is usually reffered to as "fragmentation" of land, and is considered a constraint in production. Small size land holdings present several questions among which are:

- what is the economic size of land holding whose output can support ar average family size? The quality of land and water supply is importa in answering such a question.

- what is the possibility of agricultural mechanization in the light of small land holdings? How can services be extended to farmers on a cooperative basis?

- Does land holding size present a constraint in technology dessimination and adoption, and what is the optional system for extension services needed?

The above questions present areas of research especially as they relate to feedback mechanisms on researchable topics, to technology transfer, to extension of services and to models of consolidation of land holdings.

3. Resources of Agricultural Production

3.1 Land and its potential: The area of land that is potentially suitable for crop cultivation has not been defined in the majority of Arab countries. The unclear picture about land that can be put under cultivation, is particularly true in the case of countries like Algeria, Iraq, Somalia, Sudan and Yemen Arab Republic. FAO sources, that usually quote national sources, report the total area of lands that are arable (cultivable) and those under permanent crops, at around 50 million hectares in all Arab countries. The Arab Organization for Agricultural Development (AOAD) estimates the total arable land to reach 130 million hectares. The differences between the two figures come from estimates of arable land in three countries, namely Iraq, Somalia, and Sudan. In Sudan alone, AOAD estimates arable land to reach 70 million hectares. Whatever the land that is potentially arable may be, all sources agree on two types of agricultural land. These are the irrigated and the cropped areas. For the purpose of our paper, we have adopted a figure close to FAO sources, which puts the arable land in all Arab countries at about 58 million hectares. The distribution of arable, irrigated and rainfed

areas by country are given in Table(1) . As shown in the Table the total area of irrigated lands, in 1983, reached almost nine million hectares,which is 38 per cent of the cropped land. The area of cultivated land under rainfall came to 29 million, and the uncultivated to almost 20 million hectares. What concerns us in considering this resource,is to seek indicators that will help in priority setting of research. One consideration is to consider the impact of water availability together with land resources. In 1983, for example, the value of agricultural output (production) of animal and plant commodities generated from land resources in different Arab countries were as follows:

Country	Total cultivated area in (000) ha.			Total value of agr cultural productio (mills.US $)*
	Irrigated	Rainfed	Total	
-Algeria	291	3444	3735	2999
-Egypt	2617	-	2617	5507
-Iraq	1750	2750	4500	4494
-Saudi Arabia	405	75	480	2525
-Sudan	1600	7224	8824	2094
-Syria	580	3490	4070	3815
-Tunisia	201	3623	3824	998

*In current prices

In comparing land and its output, there are of course many variables like differences of current prices used in calculating value of production, levels of productivity of land even when it is under irrigation and so on. However, in looking at the figures above,one can observe high corrolation between area of irrigated land and amounts of value of production. What we are trying to stress is the importance of irrigation in increasing production. It follows then,that whatever the amount of available water in a country, the objective should be to maximize the efficiency of water usage so as to irrigate the largest area possible.

Table(1).Use of agricultural area in Arab countries for 1983

Unit:1000 hectare

Country	Agricultural area					Per cent irrigate area of	
	Rainfed	Irrigated	Total cropped	Uncultivated	Total	Total cropped	Total
-Algeria	3444	291	3735	3496	7231	7.8	4.0
-Bahrain	-	3.7	3.7	-	3.7	100	100
-Djibouti	-	0.3	0.3	-	0.3	100	100
-Egypt	-	2617	2617	-	2617	100	100
-Iraq	2750	1750	4500	4375	8875	38.9	19.7
-Jordan	363	37	400	16	416	9.3	8.9
-Kuwait	-	5	5	15	20	100	25.0
-Lebanon	212	86	298	-	298	28.9	28.9
-Libya	1347	224	1571	526	2097	14.3	10.7
-Mauritania	126	51	177	18	195	28.8	26.2
-Morocco	4402	609	5011	2611	7622	12.2	8.0
-Oman	1	40	41	39	80	97.6	50.0
-Qatar	-	4	4	55	59	100	6.8
-Saudi Arabia	75	405	480	655	1135	84.4	85.7
-Somalia	540	160	700	366	1066	22.9	15.0
-Sudan	7224	1600	8824	3624	12448	18.1	12.9
-Syria	3490	580	4070	2035	6105	14.3	9.5
-Tunisia	3623	201	3824	872	4696	5.3	4.3
-UA Emirates	-	17	17	10	27	100	63.0
-Yemen AR	1285	230	1515	1500	3015	15.2	7.6
-Yemen Dem.	-	81	81	153	234	100	34.6
Grand totals	28882	8992	37874	20366	58240	23.7	15.4

-Notes:a-Total cropped equals cultivated area i.e. rainfed plus irrigated.
b-For some countries like Jordan and Iraq, fallow land is included in the cropped areas.

Source:Yearbook of Agricultural Statistics,Vol. 5 (1985).AOAD.Khartoum-Sudan.

3.2 Water resources: Once one considers resources for agricultural production, scarcity of water resources should never escape his mind. Seventy four per cent of the total geographic area of Arab countries receive less than 100 mm. of rain. Subsequently,these lands are classified as deserts,since water supply is much below the level of sustaining any plant growth. The other 26 per cent of the area receive rainfall distributed as follows:

Amount of rainfall (mm / year)	Per cent area in all Arab countries receiving such amounts
100 - 250	10
250 - 400	5
400 - 600	4
600 and above	7

Furthermore, the total amount of surface and underground water that can be made available for irrigation until the year 2000 comes to about 270 billion cubic meters,of which about 77 billions from underground water resources. The amount used for irrigation in the eighties has been estimated to reach 160 billion cubic meters. In 1983, about nine million hectares were irrigated. This means that an average of 18 thousand cubic meters are used to irrigate each hectare. Several studies indicate that this amount is too high to be used for each hectare,keeping in mind that we are considering averages applied to countries with different environments. In addition, studies show that the efficiency of water usage does not exceed 50 per cent in all Arab countries. This is far from records obtained in other countries where the efficiency of water usage reaches 80 to 90 per cent. The estimate water resources used for irrigation in different countries for 19 is shown in Table(2)

The future outlook for water use shows a potential of increasing irrigated areas to 15mill.hectares by the year 2000. This increases present areas of irrigated areas to 60 per cent. The possibility of increasing irrigated areas comes from two means:

Table(2)-Surface and underground water resources that are available for irrigation in Arab countries for the years 1985 and 2000

Unit:million cubic meter

Country	Surface water		Underground water		Total	
	1985	2000	1985	2000	1985	2000
-Algeria	1320	4680	1680	3320	3000	8000
-Egypt	55200	27250	378	2982	55578	30232
-Iraq	39530	27470	-	-	39530	27470
-Jordan	451	349	110	110	561	459
-Lebanon	3800	540	-	-	3800	540
-Libya	-	-	1980	1720	1980	1720
-Mauritania	-	-	84	86	84	86
-Morocco	9000	13500	130	154	9130	13654
-Oman	-	-	158	112	158	112
-Qatar	-	-	32	8	32	8
-Saudi Arabia	-	-	4950	3050	4950	3050
-Somalia	1470	1730	158	292	1628	2022
-Sudan	20550	9670	715	1366	21265	11036
-Syria	11620	9080	656	794	12276	9874
-Tunisia	850	1040	368	382	1218	1422
-UA Emirates	-	-	257	53	257	53
-Yemen AR.	850	900	330	120	1180	1020
-Other Countries	1025	1000	-	-	1025	1000
Grand totals	145666	97209	11986	14549	157652	111758

Source: Calculated from:Arab Organization for Agricultural Development: Natural Resources in Arab Countries,1980. Khartoum,Sudan

a- The optimization of on farm water use through improving the efficiency of irrigation.

b- The development of storage and transport of surface water on one hand, and the increase in underground water through exploration on the other.

3.3 Range lands and forests: Range land resources in Arab countries was reported to reach a total area of 300 million hectares. There is no productivity criterion on which range land was classified. The distribution of areas of range land by country is shown in Table(3).

The largest areas are reported in nine countries namely:

Country	Area in (000) hectares	Percentage of total
-Saudi Arabia	85000	28.4
-Sudan	56000	18.7
-Mauritania	39250	13.1
-Algeria	31000	10.4
-Somalia	28850	9.7
-Libya	13300	4.4
-Morocco	12500	4.2
-Yemen Dem.	9065	3.2
-Syria	8384	2.8
-Others	15704	5.3
Total	299053	100

Range lands are the most neglected resource in Arab countries. Extensive information exists on the potentiality of range land, the measures needed for development, present and future flora, and ecosystems. All studies conclude that measures of protection, as well as management, are critical for the improvement of productivity of range land. Several studies stress the need to determin the carrying capacity of range land to grazing animals. In 1983, the number of sheep and goats, which are the primary grazing animals, was reported to reach 116 and 59 million heads

Table(3)-Total area; and agricultural, range and forest land in Arab countries for 1983.

Unit:1000 hectare

Country	Total area	Agricultural land	Range land	Forest lar
-Algeria	238174	7504	31000	4384
-Bahrain	62	2	4	-
-Djibouti	2200	-	200	6
-Egypt	100145	2471	-	2
-Iraq	43492	5450	4000	1500
-Jordan	9774	416	100	41
-Kuwait	1782	2	134	2
-Lebanon	1040	298	10	70
-Libya	175954	2097	13300	630
-Mauritania	103070	195	39250	15134
-Morocco	44655	8394	12500	5195
-Oman	21246	43	1000	-
-Qatar	1100	3	50	-
-Saudi Arabia	214969	1135	85000	1601
-Somalia	63766	1066	28850	8710
-Sudan	250581	12448	56000	48010
-Syria	18518	5607	8384	499
-Tunisia	16361	4695	3006	555
-UA Emirates	8360	15	200	2
-Yemen AR	19500	2790	7000	1600
-Yemen Dem.	33297	212	9065	2420
Grand totals	1368046	54843	299053	90361

Source:FAO Production Yearbook, Vol.38 (1984). Food and Agriculture Organization of the United Nations. Rome-Italy.

respectively. These figures are much higher than those reported in previous years which were as follows:

	Average number in million heads in all Arab countries			
	1966 - 70	1975 - 80	1981 - 83	1983
Sheep	83	89	108	116
Goats	45	37	57	59

The fact that the number of sheep increased over the years, while that of goats is levelling off, is a healthy sign from the point of view of range management. What is significant, however, is the existing potential to raise more heads in range lands. Evidence is available that the management of range land has been improved in countries like Syria, Tunisia and Yemen Democratic. In other countries like Algeria, Iraq, Jordan, Somalia and Sudan the mangement is reproted to have a great potential.
The forest land in Arab countries is quite limited. The significance of forests in the majority of countries is not to produce wood, but rather to reduce water erosion of hilly areas and to increase recharge of underground water.

3.4 Land use patterns: During the period 1975-78, the Arab countries cultivated an average of 34 million hectares each year,of which eigh millions were under irrigation. In the year 1983, the cultivated area increased to almost 38 million hectares of which almost nine millions were under irrigation. The average for 1980-84,however,was 34,874 thousand hectares. The pattern of cultivated crops in the periods 1975-78 and 1980-84 distributed by crop and country are shown in Table(4) . The major changes in cropping pattern during thc two periods are as follows:

Crop	1975 - 78	1980 - 84	Per cent change
-Cereals (total)	68.0	65.9	- 0.1
Wheat	(27.6)	(23.1)	-13.6
Barley	(26.5)	(18.2)	13.5
Rice	(1.5)	(1.4)	- 3.5
Others (maize, Sorghum,etc..)	(22.4)	(23.2)	6.7
-Legumes	4.5	3.4	-22.6
-Vegetables	3.8	4.3	19.2
-Fruit trees	8.5	9.5	16.3
-Sugar crops	0.6	0.8	20.6
-Oil crops	6.0	6.1	5.3
-Fiber crops	3.9	3.2	-15.8
-Others (tubers & roots, fodders, and tobacco)	4.7	6.8	48.5
Total	100.0	100.0	3.1

-Note: Minus sign indicates negative value, no sign indicates positive value.

Table(4)- Average areas cultivated with main crops in Arab countries for the two periods of 1975-78 and 1980-84.

Unit:1000 hectare

Crop	Algeria		Egypt		Iraq		Jordan	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Cereals (total)	3101	2756	2016	2000	1872	2207	171	137
Wheat	2156	1674	570	566	1200	1148	128	93
Barley	832	850	44	49	582	978	41	43
Rice	1	—	441	417	50	57	—	—
Others	112	232	961	968	40	24	2	1
-Legumes	96	116	167	153	58	44	26	13
-Vegetables	84	156	369	392	200	235	28	34
-Fruits	563	676	107	118	200	240	101	121
-Oil crops	2	7	46	89	19	23	—	(..)
-Sugar crops	3	2	104	109	6	5	—	—
-Fiber crops	3	—	595	491	24	15	—	—
-Others (fodders, tubers & roots,and tobacco)	73	162	1225	1230	44	129	4	9
Totals	3925	3875	4629	4582	2423	2898	330	314

Table(4)- Cont.

Crop	Morocco		Saudi Arabia		Sudan		Syria	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Cereals (total)	4633	4459	279	382	4211	4676	2700	2689
Wheat	1830	1776	72	192	283	150	1590	1263
Barley	2186	2140	10	5	—	—	1059	1390
Rice	7	3	—	—	8	8	1	—
Others	610	540	197	185	3920	4518	50	36
-Legumes	510	349	3	—	73	22	282	225
-Vegetables	80	107	42	65	46	25	214	290
-Fruits	447	536	68	75	13	16	300	360
- Oil crops	53	43	4	2	1735	1760	55	52
-Sugar crops	64	70	—	—	17	41	10	26
-Fiber crops	19	11	—	—	434	410	189	154
-Others (fodders, tubers & roots, and tobacco)	22	149	—	121	85	58	34	58
Totals	5828	5724	396	645	6614	7008	3784	3854

Table(4)-Cont.

Crop	Tunisia		Yemen AR		Rest of countries		Totals	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Cereals (total)	1567	1432	1193	812	1262	1429	23005	22979
Wheat	1135	880	53	60	310	258	9327	8060
Barley	413	517	65	50	357	321	5589	6343
Rice	—	—	—	—	4	9	512	494
Others	19	35	1075	702	591	841	7577	8082
-Legumes	146	141	76	72	95	51	1532	1186
-Vegetables	104	88	16	30	91	96	1274	1518
-Fruits	797	877	10	12	250	291	2856	3322
-Oil crops	—	4	10	10	106	148	2030	2138
-Sugar crops	4	2	1	—	10	9	219	264
-Fiber crops	6	—	14	6	24	15	1308	1102
-Others (fodders, tubers & roots, and tobacco)	11	291	35	30	60	128	1593	2365
Totals	2635	2835	1355	972	1898	2167	33817	34874

Sources: Calculated from:

-Yearbook of Agricultural Statistics, Vols.4 and 5, (1984 & 1985), Arab Organization for Agricultural Development (AOAD), Khartoum-Suda

-FAO Production Yearbook, Vols 31, 32, 34, 36 & 38 (1977,78,80,82 & 8 Food and Agriculture Organization of the United Nations, Rome-Italy.

(See Annex(7)).

3.5 Productivity: Among the most significant feature of Arab agriculture is the low productivity of resources. Naturally, great variations in productivity exist between irrigated and rainfed areas. In addition,great variations exist in productivity levels of crops between the different countries. The constraints of high productivity were discussed in many occasions. Some were identified as being connected with the policy environment of production, some were related to the social and economic conditions of farmers,while others were related to the quality and quantity of production inputs. Production inputs as used here include seeds, fectilizers,machinary, chemicals, technical services provided to farmers and the type and size of information flow reaching farmers. The conclusions of discussions and meetings dealing with productivity indicate that there are great possibilities to improve productivity through an integrated package of measures and inputs. Table (5) presents a number of cases to illustrate the potentiality existing for productivity improvement. The productivity of major crops in each country, as well as areas cultivated with each crop are given in Annex(7).

Table(5)- Average productivity of eight basic crops in:the world, all Arab countries and in some other countries,for the periods of 1975-78 and 1980-84.

Unit:Kg/hectare

Crop	Wheat	Barley	Maize	Rice	Sorghum	Sugar-beets	Potatoes	Tomatoes
-Arab countries								
1975-78	960	770	2330	5170	717	31355	11210	14380
1980-84	1131	720	2616	5132	640	35551	12772	17162
-World								
1975-78	1720	1920	2930	2530	1286	31375	14170	20200
1980-84	2037	2064	3299	2982	1381	31603	14187	22079
-Mexico								
1975-78	3550	1730	1250	2940	2948	24917	12910	17730
1980-84	3939	1828	1733	3307	3326	-	12503	20698
-Turkey								
1975-78	1730	1814	2070	4550	-	34637	15110	32810
1980-84	1864	1962	2385	4491	-	32341	16612	32317
-USA								
1975-78	2070	2070	5740	5080	3267	44944	29130	40510
1980-84	2432	2858	6375	5263	3483	46114	30543	44811
-Record productivity	14500	11400	19300	NA	10600	121000	94100	NA

Note: NA means not available.

Sources:FAO Production Yearbook, Vols.,31, 32, 34, 36 & 38(1977,78,80,82 & 84). Food and Agriculture Organization at the United Nations, Rome-Italy. (See Annex(7)).

-Record Productivity is for 1975, taken from Boyer,1982

II. DEMAND AND SUPPLY OF FOOD COMMODITIES: THE GOOD GAP

The Arab countries represent one of the biggest food gap regions in the world. Domestic production of many basic food commodities has been falling far short of national consumptive needs. In this chapter, we'll present information on levels of domestic production of selected major food commodities, the levels of consumption and food gap existing for two periods. The periods are 1975-78 and 1980-84. We have used averages for these two periods to give a more accurate picture of the trends over a number of years. The consumption of food commodities was calculated on the basis of total domestic production of each commodity plus the net import or export of that commodity. The objective of the presentation is to stress the challanges facing Arab countries in closing the food gap on one hand, and to point out areas that may be considered as priority ones in agricultural research on the other. The food gap will be presented under headings of major food commodities.

1- Wheat: The worst situation of food gap in most Arab countries exists in wheat. The food gap has widened in the last ten years. During the period 1975-78, the Arab countries as a group, imported 53 per cent of its total needs each year. In 1980-84, however, the average food gap increased to 65 per cent each year. This means that self-sufficiency of the Arab countries as a group dropped from 47 to 35 per cent over a five year period.
The production and food gap for individual Arab countries are shown in Table (6.1). Food gap increased in all countries with the exception of Libya and Saudi Arabia.

2- Other cereals: The food gap of barley, maize and rice has increased over the years. In comparing the food gap for the Arab countries, for the two periods 1975-78 and 1980-84, the picture is as follows:

Cereal crop	Per cent food gap as annual average		Per cent increase
	1975-78	1980-84	
-Maize	25	47	88
-Barley	18	48	167
-Rice	16	37	131

The changes in food gap for individual countries ,as well as changes in production of the three cereal commodities are shown in Tables (6.2), (6.3) & (6.4).

3. Red meat and white meat: The food gap of red meat in the eighties has almost doubled from that in the late seventies. In the eighties, the Arab countries imported 19 per cent of their total consumptive needs of red meat, and 36 per cent of that of white meat. Changes in production and food gap in both types of meats in individual countries are shown in Tables (6.11) & (6.12).

4. Legumes: The picture of production and food gap of legumes has worsened in the eighties over that of the late seventies. Total production of legumes decreased in an average of 34 per cent in the eighties. The food gap of legumes more than doubled, increasing from 10 per cent in the late seventies to 25 per cent in the first years of the eighties. The picture for individual country is shown in Table (6.5).

5. Sugar: The increase in the production almost equalled that of consumption in the case of sugar. Production went up in the eighties by 350 million metric tons. Most of this increase came from government sponsored or controlled projects. The biggest increase was in Syria and Sudan. Thus, the total picture for the Arab region remained unchanged as far as the food gap is concerned (see Table 6.14).

6. Eggs in shell: Production of egg has almost doubled in the eighties over that of the late seventies. However, that increase was not enough to close the gap. Therefore, Arab countries remained in the eighties net importers of eggs. It is to be noted that increase in production in both eggs and white meat was accompanied by increases in maize importation in every Arab country. The food gap and production of eggs in individual Arab countries are shown in Table(6.13).

7. Fruits and vegetables: The brightest picture in terms of self-sufficiency of food commodities in Arab countries is represented in both fruits and vegetables. Farmers in the Arab region were able to produce enough of both groups to feed the population. In some cases, Arab countries were net exporters like in citrus and dates. The biggest food gap in individual crop is in potatoes and onions for which the food gap remained at 11-12 per cent in the eighties. The picture as it existed in individual countries is shown in Table (6.6), (6.7), (6.8) (6.9) & (6.10).

8. General remarks: The following remarks are made to point out some of the reasons behind progress made in production of some commodities in Arab countries that pertain to the theme of this paper:

a- All progress made in increasing wheat production in countries like Saudi Arabia, Egypt, and Libya resulted either through the expansion in irrigated areas cultivated with wheat, or by the increase in productivity. In the eighties, average national productivity of wheat in Saudi Arabia increased from 2 tons per hectare in 1980 to 3.1 tons in 1984. The increase, over the five years period 1980 to 1984 has been consistent, moving from 2 to 2.5, 2.6, 2.7 and 3.1 tons in the respective five years. In Egypt, productivity fluctuated within small margin during the eighties moving from 3.2 to 3.6 tons per hectare. On the whole, this is a reasonable yield in irrigated areas. There is evidence especially in Saudi Arabia that progress made in productivity was a direct result of the use of a package of technology comprising: improved seeds, moderate level of fertilizer applications and sufficient regularity in moisture supply through irrigation using pivot sprinklers. On the other hand, productivity of wheat in countries in which wheat is planted in rainfed areas, has fluctuated greatly. In 1980, rainfall was good, and productivity in Morocco, Jordan and Tunisia was around one ton per hectare. In the following years, productivity fluctuated from 0.5 to 1.2 tons depending on rainfall levels. The lesson learned from this is that sustained levels of wheat production require uniform levels of moisture. Another lesson is that irrigated areas may produce six to eight times as much as rainfed areas. If countries

of the Arab region managed to feed its population on rainfed areas in the fourties and fifties, it was because there was a good corrolation between size of population and potential productivity levels of the land. If the population is small, the land can feed them. However, as population increased the traditional way of producing wheat to feed them did not prove to be a sound policy. The new strategy for producing wheat must be based on the use of either irrigated land or rainfed lands with supplementary irrigation. It is in these lands where the use of technological inputs can produce higher output needed to cope with increased demand on wheat. The technology of producing wheat in rainfed areas with supplementary irrigation nominates itself as a top priority research area.

b- In all Arab countries, production of fruits and vegetables is being carried out with the best resources available. Arab countries, as a result, are faced with two options:either to continue to expand in the production of these commodities in good lands with semi-traditional technology, thus eating up more of the good lands; or to adopt a strategy of modernizing their fruit and vegetable production technology,thus stopping further expansion and perhaps saving some of the land to be used for the cultivation of basic food commodities. There are experiences already existing in some Arab countries that showed that vegetable or fruit productivity can be increased four to eight times through the use of integrated packages of technology.

c- What was said about fluctuation in yields of wheat in rainfed areas holds true in the case of legumes. Most legumes, especially lentils and chick peas, are cultivated in rainfed areas. New advances in germplasm and cultural practices require an environment with minimal stress. Stress from draught, for example, continues to be the most limiting factor in the face of Arab agriculture in benefiting from advances made in production technology.

d- For the purpose of comparison of situation in individual countries vis-a-vis production, balance of import/export, total requirement and per cent self-sufficiency,see Annex(7).

9. Future outlook: Unless domestic production increases at rates higher than those in consumption, food gap will continue to increase. To feed the people, Arab countries would have to continue to allocate funds to import food materials from other sources of production.Some countries may have to look for loans to purchase food commodities from world markets. Needless to say that such situation may become disastrous especially to countries that have limited sources of foriegn currency. During the period 1975-1984, increase in total food production of all Arab countries was less than increase in consumption in all commodities except for eggs (see Tables 7 and 8). The picture looked like this:

Commodity	Average annual rate of change of major food commodities in Arab countries (%)	
	Production	Consumption
-Wheat	0.4	5.7
-Maize	1.4	8.8
-Barley	1.2	10.5
-Rice	-1.2	4.2
-Legumes	-3.8	-3.9
-Vegetables	5.8	6.2
-Fruits	2.3	4.1
-Red meat	6.0	8.3
-White meat	20.8	30.0
-Eggs	16.7	12.5
-Sugar	5.6	4.0

Note: Minus sign means decrease, no sign means increase.

The above shows clearly that consumption rates of increase are much higher than production ones. In the case of legumes,demand for legumes did not lead to further imports. This aspect of consumptive pattern should be studied.

One cannot be but pessimistic about the future. Arab countries, do not only have to curb their consuption, but should increase their domestic production in much higher rates than present ones. Past experience has shown that methods and approaches to deal with the food gap situation did not give satisfactory results. Non traditional approaches should be tried both in agricultural policies, in the type of technology applied,and in the type of technical support system serving production systems. Priorities of research related to this question will be discussed under the following chapter.

Table(6.1) Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-84

Commodity:Wheat

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	1314	1080	-18	51	73	43
-Egypt	1906	1915	0	63	73	16
-Iraq	940	797	-15	43	70	63
-Jordan	59	76	29	80	83	4
-Libya	92	161	75	84	79	-6
-Morocco	1718	1769	3	44	52	18
-Saudi Arabia	131	523	299	79	55	-30
-Sudan	312	179	-43	36	66	83
-Syria	1552	1706	10	20	27	35
-Tunisia	791	816	3	35	43	23
-Yemen AR	49	57	16	85	89	5
-Others	84	36	66	92	97	5
Totals	8948	9115	2	53	65	23

-Notes:a-Food gap=total consumption-net domestic production used for local consumption=net imports (balance)

b-Minus sign means decrease, no sign means increase

c-NA means not available.

- For sources, see page 50.

Table(6.2) Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-84.

Commodity:Maize

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	4	2	-50	97	99	2
-Egypt	2935	3399	16	16	18	13
-Iraq	61	36	-41	23	80	248
-Jordan	-	0.5	50	100	99.7	-0
-Libya	2	1	-50	83	98	18
-Morocco	360	232	-36	9	17	89
-Saudi Arabia	4	2	-50	97	99.8	3
-Sudan	50	36	-28	0	0	0
-Syria	51	41	-20	37	82	122
-Tunisia	-	-	0	100	100	0
-Yemen AR	79	48	-39	7	9	29
-Others	113	163	44	64	65	2
Totals	3659	3961	8	25	47	88

-Notes:a-Food gap=total consumption-net domestic production used for local consumption=net imports (balance)

b-Minus sign means decrease, no sign means increase

c-NA means not available.

-For sources, see page 50.

Table(6.3) Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-84

Commodity:Barley

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	457	567	24	27	41	43
-Egypt	124	127	2	1	6	500
-Iraq	520	729	40	87	24	-72
-Jordan	13	22	69	67	72	7
-Libya	177	113	-36	75	53	-29
-Morocco	2031	1643	-19	2	6	200
-Saudi Arabia	15	6	-60	75	99.8	33
-Sudan	-	-	0	100	100	0
-Syria	674	1000	48	8	4	-50
-Tunisia	219	304	39	17	13	-24
-Yemen AR	65	47	-28	0	2	200
-Others	10	9	-10	89	97	9
Totals	4305	4568	6	18	48	167

Notes:a-Food gap=total consumption-net domestic production used for local consumption= net imports (balance)

b-Minus sign means decrease, no sign means increase

c-NA means not available.

-For sources, see page 50.

Table(6.4) Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-84

Commodity:Rice

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	2	-	-100	83	100	21
-Egypt	2451	2347	-4	-8	-3	63
-Iraq	149	140	-6	38	70	84
-Jordan	-	-	0	100	100	0
-Libya	-	-	0	100	100	0
-Morocco	23	13	-43	-10	35	450
-Saudi Arabia	-	-	0	100	100	0
-Sudan	9	7	-22	10	77	670
-Syria	3	-	-100	95	100	5
-Tunisia	-	-	0	100	100	0
-Yemen AR	-	-	0	100	100	0
-Others	14	25	79	95	95	0
Totals	2651	2532	5	16	37	131

-Notes:a-Food gap=total consumption-net domestic production used for local consumption= net imports (balance)

b-Minus sign means decrease, no sign means increase

c- NA means not available.

-For sources, see page 50.

Table(6.5) Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-1983.

Commodity:Legumes (total)

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-83	% Change	1975-78	1981-83	% Change
-Algeria	70	40	-43	37	72	95
-Egypt	342	317	-7	23	23	0
-Iraq	47	34	-28	32	50	56
-Jordan	11	10	-9	8	54	575
-Libya	51	10	-80	12	66	450
-Morocco	345	191	-45	-5	-3	40
-Saudi Arabia	5	-	-100	74	100	35
-Sudan	78	34	-56	1	24	2300
-Syria	217	185	-15	-21	-19	10
-Tunisia	235	89	-62	-5	-8	-60
-Yemen AR	76	65	-14	3	1	-67
-Others	43	22	-49	44	75	70
Totals	1520	997	-34	10	25	150

-Notes:a-Food gap=total consumption-net domestic production used for local consumption=net imports (balance).

b-Minus sign means decrease, no sign means increase

c-NA means not available.

-For sources, see page 50.

Table(6.6)·Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-83

Commodity:Vegetables (total)

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-83	% Change	1975-78	1981-83	% Change
-Algeria	650	961	48	NA	1	NA
-Egypt	6506	7597	17	=	-2	=
-Iraq	1581	2273	44	=	2	=
-Jordan	259	447	73	=	-223	=
-Libya	435	663	52	=	0	=
-Morocco	1184	2063	74	=	-3	=
-Saudi Arabia	570	914	60	=	28	=
-Sudan	774	776	0	=	0	=
-Syria	2252	3652	62	=	2	=
-Tunisia	891	1087	22	=	0	=
-Yemen AR	179	308	72	=	4	=
-Others	559	950	70	=	31	=
Totals	15840	21691	37	NA	2	NA

-Notes:a-Food gap=total consumption-net domestic production used for local consumption= net imports (balance).

b-Minus sign means decrease, no sign means increase

c-NA means not available.

-For sources, see page 50.

Table(6.7) Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-83.

Commodity:Fruits (total)

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-83	% Change	1975-78	1981-83	% Change
-Algeria	1314	765	-42	NA	2	
-Egypt	2016	2741	36	=	-4	-6
-Iraq	833	1113	34	=	-3	-8
-Jordan	47	83	77	=	-21	-2
-Libya	147	285	94	=	9	12
-Morocco	1241	1679	35	=	-55	-28
-Saudi Arabia	379	461	22	=	57	6
-Sudan	715	763	7	=	0	0
-Syria	588	944	61	=	11	
-Tunisia	459	530	16	=	-3	
-Yemen AR	179	158	-12	=	36	
-Others	1006	1040	3	=	10	
Totals	8924	10562	18	NA	2	NA

-Notes:a-Food gap=total consumption-net domestic production used for local consumption= net imports (balance)

b-Minus sign means decrease, no sign means increase

c-NA means not available.

-For sources, see page 50.

Table(6.8) Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-84

Commodity:Dry onions

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	94	122	30	-1	0	100
-Egypt	628	601	-4	-13	-5	62
-Iraq	96	115	20	0	13	1300
-Jordan	0	9	-	100	60	-40
-Libya	53	73	38	0	1	100
-Morocco	79	187	137	-4	-1	75
-Saudi Arabia	59	35	-41	35	75	114
-Sudan	20	56	180	-5	0	500
-Syria	140	169	21	-5	-3	40
-Tunisia	22	24	9	0	-2	200
-Yemen AR	-	-	-	100	100	0
-Others	45	41	28	52	70	35
Totals	1236	1432	16	0	12	1200

-Notes:a-Food gap=total consumption-net domestic production used for local consumption=net imports (balance).

b-Minus sign means decrease, no sign means increase.

c-NA means not available

-For sources, see page 50.

Table(6.9)Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-84

Commodity:Tomatoes

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	173	284	64	0	0	0
-Egypt	1911	2608	36	0	0	0
-Iraq	389	416	7	-1	4	500
-Jordan	143	195	36	-86	-186	-116
-Libya	220	199	-10	0	0	0
-Morocco	426	377	-12	-32	-23	28
-Saudi Arabia	264	267	1	1	27	2600
-Sudan	140	130	-7	0	0	0
-Syria	477	746	56	6	6	0
-Tunisia	273	342	25	0	0	0
-Yemen AR	0	0	0	100	100	0
-Others	93	250	169	27	17	-37
Totals	4509	5814	29	-2	0	100

-Notes:a-Food gap=total consumption-net domestic production used for local consumption=net imports (balance).

b-Minus sign means decrease, no sign means increase.

c-NA means not available.

-For sources,see page 50.

Table(6.10)Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-84.

Commodity:Potatoes

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	515	525	2	16	30	88
-Egypt	894	1178	32	-11	-10	9
-Iraq	48	99	106	17	22	29
-Jordan	11	9	-18	66	77	17
-Libya	85	108	27	2	4	100
-Morocco	184	448	143	-13	-3	77
-Saudi Arabia	1	4	300	97	100	3
-Sudan	25	18	-28	0	3	300
-Syria	114	295	159	10	1	-90
-Tunisia	99	132	33	14	12	-14
-Yemen AR	94	148	57	0	0	0
-Others	91	144	58	30	37	23
Totals	2161	3108	44	6	11	83

-Notes:a-Food gap=total consumption-net domestic production used for local consumption=net imports (balance).

b-Minus sign means decrease, no sign means increase.

c-NA means not available.

-For sources, see page 50.

Table(6.11) Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-84

Commodity:Red meat

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	85	144	69	7	16	129
-Egypt	279	330	18	12	25	108
-Iraq	99	100	1	11	37	236
-Jordan	14	8	-43	26	73	181
-Libya	54	55	2	16	25	56
-Morocco	138	190	38	1	1	0
-Saudi Arabia	49	143	192	43	36	-16
-Sudan	279	414	48	0	0	0
-Syria	72	133	85	5	5	0
-Tunisia	73	59	-19	5	15	200
-Yemen AR	63	37	-41	5	3	-40
-Others	195	313	61	19	24	26
Totals	1400	1926	27	10	19	90

-Notes:a-Food gap=total consumption-net domestic production used for local consumption=net imports (balance).

b-Minus sign means decrease, no sign means increase.

c-NA means not available.

-For sources, see page 50.

Table(6.12)-Production and gap of some basic food commodities in Arab countries and their changes over the period1975-84.

Commodity:White meat (poultry meat)

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	39	102	162	0	0	0
-Egypt	84	162	93	6	25	317
-Iraq	34	116	241	37	41	11
-Jordan	20	32	60	5	18	260
-Libya	6	36	500	0	0	0
-Morocco	47	101	115	0	0	0
-Saudi Arabia	33	103	212	69	65	-6
-Sudan	13	25	92	0	0	0
-Syria	27	68	152	0	0	0
-Tunisia	29	42	49	0	0	0
-Yemen AR	1	15	1400	92	71	-23
-Others	31	66	113	66	62	-6
Totals	364	868	238	32	36	13

Notes:a-Food gap=total consumption-net domestic production used for local consumption=net imports (balance).

b-Minus sign means decrease, no sign means increase.

c-NA means not available.

-For sources, see page 50.

Table(6.13)Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-84

Commodity:Eggs in shell (for human consumption)

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	17	27	59	47	66	40
-Egypt	69	118	71	0	7	700
-Iraq	18	45	150	42	37	-12
-Jordan	8	20	150	17	-17	-200
-Libya	3	19	533	25	7	-72
-Morocco	57	45	-21	0	0	0
-Saudi Arabia	16	69	331	38	11	-71
-Sudan	21	30	43	0	0	0
-Syria	33	82	149	6	0	-100
-Tunisia	22	42	91	4	0	-100
-Yemen AR	3	7	133	40	53	33
-Others	29	62	114	19	36	90
Totals	296	567	92	15	20	33

-Notesa-Food gap=total consumption-net domestic production used for local consumption=net imports (balance).

b-Minus sign means decrease, no sign means increase.

c-NA means not available.

-For sources, see page 50.

Table(6.14) Production and gap of some basic food commodities in Arab countries and their changes over the period 1975-84

Commodity: Sugar (refined)

Country	Production (1000 MT)			Food gap (%)		
	1975-78	1980-84	% Change	1975-78	1980-84	% Change
-Algeria	8	-	-1	98	100	2
-Egypt	630	672	7	23	41	78
-Iraq	30	26	-13	93	92	-1
-Jordan	-	-	-	100	100	-
-Libya	-	-	0	100	100	0
-Morocco	295	398	35	51	28	-45
-Saudi Arabia	-	-	0	100	100	0
-Sudan	161	276	71	51	48	-6
-Syria	29	142	390	85	66	-22
-Tunisia	10	8	-20	93	95	2
-Yemen AR	-	-	0	100	100	0
-Others	49	39	-20	14	9	-36
Totals	1212	1562	29	32.6	33	1

-Notes: a-Food gap=total consumption-net domestic production used for local consumption= net imports (balance).

b-Minus sign means decrease, no sign means increase.

c-NA means not available.

-Sources:-Figures for 1980-84 are from:(see Annexes 7+8).

a-Yearbook of Agricultural Statistics, Vols.4 & 5(1984&1985).AOAD. Khartoum-Sudan.

b-FAO Production Yearbook,Vols.36 & 38 (1982 & 1984).Food and Agriculture Organization of the United Nations. Rome-Italy.

c-FAO Trade Yearbook, Vols.36 & 38 (1982 & 1984) Food and Agriculture Organization of the United Nations. Rome-Italy.

-Figures for 1975-78 are from Qasem,1982.

Table(7)-Changes in average quantities of production of major food commodities in Arab countries over the period 1975-84.

Commodity	Average production per year (million metric tons)		Per cent change	
	1975-1978	1980-1984	Total period	Annual
-Wheat	8.9	9.1	2.2	0.4
-Maize	3.7	4.0	8.1	1.4
-Barley	4.3	4.6	7.0	1.2
-Rice	2.7	2.5	-7.4	-1.2
-Legumes	1.3	1.0	-23.0	-3.8
-Vegetables	16.1	21.7	34.8	5.8
-Fruits	9.3	10.6	14.0	2.3
-Red meat	1.4	1.9	35.7	6.0
-White meat	0.4	0.9	125.0	20.8
-Eggs	0.3	0.6	100.0	16.7
-Sugar	1.2	1.6	33.3	5.6

-Notes: a-Annual per cent change was calculated by dividing total period change by six. The latter number represents number of middle years of the two periods i.e. from 1977 to 82.

b-Minus sign means decrease, no sign meanse increase.

c-All figures were rounded.

Source:-Figures from1980-84 are calculated from Annexes. Those for 1975-78 are from Qasem 1982.

Table(8)-Changes in average quantities of consumption of major food commodities in Arab countries over the period 1975-84.

Commodity	Average of actual consuption per year (million metric tons)		Per cent change	
	1975-78	1980-84	Total period	Annual
-Wheat	19.2	25.8	34.4	5.7
-Maize	4.9	7.5	53.1	8.8
-Barley	5.4	8.8	63.0	10.5
-Rice	3.2	4.0	25.0	4.2
-Legumes	1.7	1.3	-23.5	-3.9
-Vegetables	16.1	22.1	37.0	6.2
-Fruits	8.1	10.1	24.7	4.1
- Red meat	1.6	2.4	50.0	8.3
-White meat	0.5	1.4	180.0	30.0
-Eggs	0.4	0.7	75.0	12.5
-Sugar	3.8	4.7	24.0	4.0

Notes: a-Annual per cent change was calculated by dividing total period change by six. The latter number represents number of middle years of the two periods i.e. from 1977-82.

b- Minus sign means decrease, no sign means increase.

c- All figures were rounded.

Source:-Figures for 1980-84 are calculated from Annexes. Those for 1975-78 are from Qasem 1982.

III.AGRICULTURAL RESEARCH SYSTEMS IN ARAB COUNTRIES

Introductory Remark

In this chapter, agricultural research systems in the Arab countries will be analysed in order to bring out points of strength and weakness in each system. The alternative approaches to the analysis were: either to consider each system as a unit and review it with regard to six major features, or to review relevant information of the different research systems within each major feature. The major features of the systems that we propose to review in terms of strengths and weaknesses are:

1- Organization and structure
2- Manpower
3- Physical facilities
4- Programming
5- Linkage's
6- Outside support

We chose to follow the second option in which relevant information of the different systems will be analysed and discussed within each feature. Special features of any system will also be discussed in the presentation. One final remark with regard the term "system" agricultural research system, referred to hereafter as system, has been chosen to refer to all aspects of agricultural research activities in all institutions in any one country. The term implies an organiztional concept in which functions, structures, inputs and outputs of an institution (or institutions) are identified and developed. The term may not apply to research activities in several Arab countries. However, the term as used here will refer to all aspects related to agricultural research in any one country regardless of the degree of its development.

1. Organization and Structure of Systems

All Arab countries have research activities in agriculture. Some have well-developed systems, while others have activities that are part of a multifunctional organization serving agriculture. There is no homogenicity in the way Arab countries have opted to organize the structure and functions of agricultural research. Hence, we propose a model under which research systems may be classified i.e. to organize our discussion with regard to this feature under two main headlines:

A- Research in ministries.
B- Research in universities.

Under each of the two catagories, the main organizational features will be discussed under the following headlines:

- Name and what does it imply organizationally
- Degree of autonomy
- Fragmentation of institutions

A- Research in ministries:

All Arab countries have research activities as one function among others in the ministries concerned. One exception to this organizational feature is Iraq, in which one of the two agricultural research centers is under the direct control of the "Iraqi Scientific Research Council".

The names of the agricultural research institutions in the ministries are given in Table(9) . The following is a classification of such institutions by name, number and country:

Name	Number	Countries and number in each
Center	12	-Egypt(2), Saudi Arabia(7), Libya(1), Tunisia(2)
Institute	7	-Tunis(4),Morocco(1),Egypt(1),Lebanon(1)
Authority	2	-Iraq(1), Yemen,AR(1)
Corporation	1	-Sudan(1)
Department	6	-Syria(2),Qatar(1),UA Emirates(1), Yemen Dem.(1), Somalia(1)
Division	2	-Jordan(1), Tunis(1)
Branch or Unit	2	-Egypt(1), Algeria(1)
Total	32	

The ministries with which these research institutions are affiliated, in addition to their number in each ministry are the following:

Ministry	Number of research institutions	Countries
Ministry of Agriculture	24	-All Countries have one or more, except Libya and Algeria
Ministry of Irrigation	2	-Iraq, Egypt
Ministry of Research and Higher Education	3	-Algeria, Libya, Tunis
Ministry of Scientific Research	2	-Libya, Egypt
Ministry of Agricultural Reform	1	-Egypt
Total	32	

Table(9)- Names of agricultural research institutions under ministries in Arab countries (1985).

A. Institutions organized under ministries of agriculture:

Country	Name of main organizations	Sub-organizational structures
-Egypt	-Agricultural Research Center	institutes,stations
-Iraq	-Public Organization of Applied Agricultural Research	centers, stations
-Jordan	-Agricultural Research Division	stations
-Kuwait	-Agricultural departments	research as a function of various branches
-Lebanon	-Agricultural Research Institute	stations
-Morocco	-National Institute of Agricultural Research	divisions,stations
-Qatar	-Agricultural Research Department	research as a function of various branches
-Saudi Arabia	-Seven agricultural research centers each named after two commodities	department
-Somalia	-Agricultural Research Department.	
-Sudan	-Agricultural Research Corporation	centers,stations
-Syria	-Directorate of Agricultural Research	divisions,stations
-Tunisia	-National Institute of Agricultural Research -National Institute of Forestry Research -National Institute of Oceonography and Fisheries -Rural Development Research Center -Soil Division -Institute of Olive Research	divisions,stations

Table(9)-Cont....2

Country	Name of main organizations	Sub-organizational structures
-UA Emirates	-Agricultural departments in various regions	research as a function of each dept.
-Yemen AR	-Agricultural Research Authority	stations
-Yemen Dem.	-Agricultural Research and Extension Directorate	centers

B. Institutions organized under ministries other than agriculture:

Country	Name of main organizations
-Algeria	-Units of research/Ministry of Higher Education and Research
-Egypt	-Desert Research Center/ Ministry of Agricultural Reform -Water Research Center/ Ministry of Irrigation -Agricultural and Sciological Research Branch (Division), National Research Center/ Ministry of Scientific Research
-Iraq	-Soil and Land Reclamation Center/ Ministry of Irrigation -Agricultural Research Center/ Ministry of Scientific Research
-Tunisia	-Institute of Arid Zone Research Research/Ministry of Higher Education & Research

A-1 Name and what does it imply organizationally:

It is clear from the above that organization and structure of agricultural research institutions in the Arab countries is quite heterogeneous. The term "center", for example, has been used loosely. It does not consistantly reflect size, scope, or structure in the various countries. The "Agricultural Research Center" in Egypt is made up of thirteen commodity or disciplinary institutes and several central service units or laboratories. In Iraq and Saudi Arabia, the term usually has a scope of research on one commodity or discpline. In Tunis, center is a smaller organizational structure than institute. The term "authority" is used in Yemen AR and Iraq, while Sudan chose "corporation". The two English names correspond to the same Arabic term "hayia". The term suggests an organizational structure of a wide scope encompassing most, if not all, commodity or disciplinary units of agricultural research in the country.

A-2 Degree of autonomy:

Autonomy is used here to reflect the degree of financial and administrative flexibility needed for efficient performance in research institutions. All research institutions in ministries suffer from one aspect or another of routine and rigid procedures.Research function has developed in ministries with no parallel development in special procedures needed for its efficient performance. Naturally, the degree of development differs from one country to another and from one institutional organization to another. It is not the intention here to review such complex issue, but rather to highlight features that are critical in the performance of the research function.

The following is a compartive presentation of some of these features and how they are handled in the various institutional organization:

Indicator of institutional autonomy	How is it handled in	
	Authority, National Center, or National Institute	Department, Division or Branch
-Procedures and authority to hire, promote or fire senior or junior researchers	Central	Central
-Procedures to hire, promote, or fire other employees including daily workers	Central	Central
-Procedures to hire or fire occasional labour	Within institution	Central
-Institution has separate Line item in budget of ministry		
-Authority of head of institution to administer incentives	None	None
-Authority to dispense operational funds	Limited	does not usually exist
-Purchase of equipments	Central	Central
-Access to transportation needed for mobility of researchers	Limited in most cases	Very limited in most cases

Note: Central means that authority is in the hands of persons, committees or departments that are outside the authority of research institutions, and often are handled by central agencies of the ministry or the government.

The above presentation suggests that research institutions may differ in name, size or structure, but are quite similar in respect to many of the autonomy features. The degree of autonomy to research institutions is one of the most controversial issues in the Arab countries. Research leaders claim that the limited degree of autonomy they have, hinders the performance of their institutions. On the other hand, policy-makers and senior decision-makers claim that research function is not so different from other functions, and thus can be performed under procedures existing in the ministry. What is needed, they claim, are capable managers who can perform under the existing procedures.

Is research such an alien to government functions that it cannot be carried out except under special procedures?. Are government procedures so complex and conventional that they are not suitable for either research or other functions?. These and other questions are management issues that may not be resolved soon, but certainely require further analysis and study.

A-3 Fragmentation:

The multiplicity of institutions involved in research in several Arab countries, presents a problem of coordination and linkage relationships with other institutions inside and outside the country. This institutional issue has always been brought up by donor agencies as well as by clients of research. The problem has been solved in many countries including Sudan, Egypt, Morocco and Yemen AR. However, the problem is still pending in countries like Tunisia and Syria where more than one institution in the ministries are organized and in operation. The issue has recently been studied in Tunisia by ISNAR and the recommendation is that research institutions should be consolidated in one national organization.

B- Research in university :

These are eighty two universities in the Arab countries with 35 having faculties (colleges) of agriculture, and 7 having faculties of veterinary medicine. The distribution of agricultural and veterinary faculties in the Arab countries (listed in Table(10) is as follows:

Number of faculties of agriculture in each country	Countries
None	-Mauritania, Bahrain, Qatar, Kuwait, Djibouti
One	-Yemen AR, Yemen Democratic, Somalia, Oman, Lebanon, UA Emirates (total 6)
Two	-Jordan, Tunisia, Algeria (total 6)
Three	-Libya, Sudan, Morocco, Saudi Arabia, (total 12)
Four	-Iraq, Syria (total 8)
Thirteen	-Egypt (total 13)
	(Grand total=45)

Number of faculties of veterinary medicine in each country	Countries
One	-Sudan, Morocco, Tunis, Saudi Arabia
Two	-Iraq
Four	-Egypt
None	-All the rest
	(Grand total=10)

Table(10)-Faculties and institutes of agriculture and veterinary medicine in Arab countries (1985).

A. Faculties and institutes of agriculture:

1- Algeria:- National Institute of Agriculture, Al-Harash, Ministry of Higher Education and Research, Algiers-Algeria.

2- Egypt:- Thirteen faculties of agriculture in Egyption universities as follows:

- One in each of the following universities:
  University of;Alexanderia, Ain Shams,
  Asyout, Azhar, Mansoura, Minya,
  Shbien-El-Khoum (Minoufiya), Qanat El-Suez (Suez Canal),Tanta

- Two faculties in the University of Caior:
  in the Cairo Campus in Giza, and in the Fayoum Campus in Fayoum

- Two in the University of Zaqazzeq:
  in the Zaqazzeq Campus in Zaqazzeq and in Mushtaher Campus in Mushtaher.

3- Iraq:- Four faculties of agriculture, one in each of the following Iraqi universities:
University of;Bhagdad (Abu-Grieb),
Basra, Musel, Salah Elddin.

4- Jordan:- Two faculties of agriculture; one in the University of Jordan, and the other in the University of Science and Technology (Irbid).

Table(10)-Cont.....2

5- Libya:- Two faculties of agriculture in the universities one in University of Tripoli and the other in University of Ben-Ghazi; and one college:The Agricultural College of Omar Mukhtar.

6- Morocco:- King Hassan Institute of Agriculture and Veterinary Medicine (Rabat), and the National School of Agriculture in Meknas.

7- Saudi Arabia:- Three faculties in the universities: two in the University of King Saud (in Riyad, and in Kasseem),and one faculty in the University of King Faisal.

8- Sudan:- Three faculties, in each of the following university: University of; Khartoum, Juba, Gazira.

9- Syria:- Four faculties in the universities as follows:One in each of the University of; Aleppo, Damascus, Al-Baath, Tashreen.

10- Tunisia:- National Institute of Agriculture in Tunis

11- One faculty of agriculture in each of the following countries/ universities:

- University of Sana', Yemen AR.
- University of Aden, Yemen Dem.
- American University of Beirut, Lebanon
- University of the Emirates, UA Emirates.
- University of Qaboos, Oman.
- University of Somalia, Somalia.

Table(10)- Cont....3

Summary of A:

Country	Number of faculties or institutes of agric.
-Algeria	2
-Egypt	13
-Iraq	4
-Jordan	2
-Libya	3
-Morocco	3
-Saudi Arabia	3
-Sudan	3
-Syria	4
-Tunisia	2
-Lebanon, Oman, Somalia, UA Emirates, Yemen AR, Yemen Dem.(one in each)	6
Total	45

B.Faculties or institutes of veterinary medicine

1- Egypt: Three faculties one in each of the following universities: University of; Cairo, Alexandrea, Asyout.

2- Iraq: Two faculties one in each of the University of Baghdad and Musel.

3- Algeria:One Ecole of Veterinary Medicine

4- Sudan:One Faculty in the University of Khartoum

Most faculties of agriculture were established in the sixties and seventies. Few, including that at the University of Cairo and Khartoum, were established before 1950. Most, if not all, faculties of agriculture were established with teaching as their primary function. Over the years, research activities of the staff and graduate students have builtup. The trend in many countries is to strengthen the role of the agricultural faculties in the national research system. In some countries like,Iraq, Jordan, Egypt, Sudan,Morocco, and Algeria, plans and programs were developed to integrate research activities of agricultural faculties in the national research effort. The assessment of the role of agricultural faculties in the national effort of agricultural research as they stand today may be summarized as follows:

Faculties of agriculture in University of	Role of faculty of agriculture in the national effort as measured by a scale of 1 to 5; 1=negligable-5=strong
- Baghdad,Musel, Alexandria, Cairo, King Hassan of Morocco, and Jordan	4-5
-Khartoum, Asyout, Al-Arish,and Aleppo	2-3
-All others	1

All faculties of agriculture are within university system. Before few years, colleges or institutes of agriculture were under the umbrella of ministry of agriculture in each of Tunis, Algeria and Morocco. Organizationally, these faculties are all structured into desciplinary departments. An exception is "The Institute of Cotton" in Cairo University and the Faculty of Natural Resources in Juba University.

The degree of autonomy in the faculties of agriculture is linked with the university system. All Arab countries that have more than one university, have resorted in recent years to create ministries of higher education that coordinate the activities of the universities. In some countries, like Syria, Iraq, Libya and Algeria,the role of the ministry in coordinating the work of the universities is strong,

2. Manpower in Agricultural Research:

There are two main groups of manpower involved in research in Arab countries. The first group devotes all of its time to research and allied services like extension and other activities related to application of research results. This group works in research institution under ministries. The second group devotes only part of their time to research and spends the other part in teaching. This group works in faculties of agriculutre. The time allocated to research is more clearly defined in research institutions under ministries than in faculties of agriculture. Thus, it is difficult to calculate the full time equivalent of those working as part time in research in the universities With these introductory remarks, the number, level and field of specialization of those working in research will be reviewed. Fruthermore, the allocation of these human resources to various fields of research will be discussed.

2.1 Manpower in institutions outside universities:

The number, level of qualification, and nationality groups of research workers in twenty Arab countries are shown in Table (11). In all case, figures shown in the table are the latest available, and for the majority of the countries are for 1984-1985.

2.1.1 Number and level of qualification: Aside from Egypt and Sudan, number of researchers qualified to the Ph.D level is quite low when compared to the M Sc. level. There are no recognized criterion by which research systems are measured with regard to level of qualification. Some authorities believe that meaningful research can be carried out only with a minimum qualifications of Ph.D. Others, accept a mix of qualifications in a team of research, especially when research is of an applied nature. The percentages of Ph.D, M Sc. or B Sc. in the mix is controversial. For the purpose of our analysis of the aggregate number of manpower involved in research we propose two levels. The first, having a mix of 50 per cent Ph.D and 50 per cent others. This level will be considered acceptable. The second, is having a mix of 25 per cent or below Ph.D and 75 per cent others. Such mix will be considered weak. The mix in manpower working in research in Arab countries is as follows:

Country or Countries	Percentage of Ph.D	Percentage of M Sc. & B Sc.	Remarks
-Sudan	49	51	acceptable
-Egypt	41	59	Strongly acceptable
-Saudi Arabia	31	69	moderately acceptable
-UA Emirates	25	75	weak
-Somalia	24	76	weak
-Kuwait & Yemen AR	23	77	weak
-Iraq & Jordan	19	81	weak
-Qatar	18	82	weak
-Lebanon & Libya	16	84	quite weak
-Algeria,Morocco, Oman,Syria & Yemen Democratic	below 15	above 85	very weak

Table(11)-Manpower working in agricultural research institutions outside universities in Arab countries (1984-85).

Country	Number of research workers									
	PhD holders				M.Sc ~~PhD~~ holders				BSc holders	Grand total per country
	N	A	F	Total	N	A	F	Total		
-Algeria	2	-	1	3	12	-	2	14	75	92
-Egypt	1318	-	-	1318	1316	-	-	1316	555	3189
-Iraq	131	-	-	131	337	-	-	337	225	693
-Jordan	9	-	3	12	19	-	-	19	32	63
-Kuwait	1	15	2	18	3	9	2	14	48	80
-Lebanon*	7	-	1	8	10	-	5	15	28	51
-Libya	12	15	-	27	31	29	-	60	78	165
-Morocco	2	-	-	2	85	-	4	89	80	171
-Oman	-	3	-	3	-	8	-	8	12	23
-Qatar	-	2	1	3	2	4	-	6	8	17
-Saudi Arabia	6	22	33	61	11	22	6	39	9	19
-Somalia	-	6	-	6	-	-	8	8	11	25
-Sudan	129	2	-	131	59	-	-	59	79	269
-Syria	21	-	1	22	30	-	2	32	142	196
-Tunisia	23	-	4	27	70	-	-	70	38	135
-UA Emirates	-	3	-	3	-	4	-	4	5	12
-Yemen AR	7	3	6	16	22	3	-	25	29	70
-Yemen Dem.	7	2	3	12	40	2	-	42	32	86
Grand totals	1675	73	55	1803	2047	81	29	2157	1573	5533

-Note:a-Figures of Lebanon are for 1979.

b-Abbreviations :

N:Nationals

A:Arabs

F:Foreigners

Source:Calculated from figures of Annex(9).

2.1.2 Nationality groups of research workers: Some countries have resorted to employ non-nationals to participate in the implementation of research activities. In some cases like Saudi Arabia and other oil-exporting countries, non-nationals are hired from national budget. In other cases, however, like Morocco, Tunisia and Yemen AR, non-nationals are hired from outside grants or loans. On top of the countries that employ non-nationals in their research systems is Saudi Arabia, where non-nationals constituate more than seventy per cent of the total at the Ph.D and M Sc. levels. This may be viewed as a sign of national commitment to research.

2.1.3 Allocation of manpower resources to various fields: The more critical and meaningful analysis of manpower is with regard to allocation of such resources to various fields of research. The figures at hand are those of institutions outside the universities. One would assume that the total time of people is devoted to research. In all reported figures, extension personnel were not included. However, in countries like Algeria and Yemen Democratic, it was not easy to distinguish or separate the functions. But inspite of the difficulties, the figures presented are as close to the true picture as they can be. Information concerning human resource allocation to various fields was not always available. The numbers and levels of qualifications allocated to major areas are given for each country in Annex(9) From these countries, we propose to choose, eight countries for which information is available and in which agriculture constitutes a good share of gross domestic prodution. Available information for these countries will be reviewed and analyzed in a compartive approach. Only manpower of Ph.D and MSc. level will be used for analysis. The allocations in percentages are shown in Table(12).

In assessing manpower allocations, one comes with the following observations:

a- All countries are moderately strong in plant production

b- There are some distortions in manpower allocated to plant production. A glaring example is Sudan in which almost 20 per cent of the manpower is allocated to research on fruits and vegetables, while the two groups of crops contribute less

than 5 per cent of the total value of domestic agricultural production.

c- All countries are also moderately strong in plant protection.

d- Research manpower in plant production and allied fields i.e. plant protection, soil and irrigation, and mechanization account for more than 80 per cent of total manpower in research in all countries. In a country like Sudan and Iraq where sheep and animal wealth in general is quite important to the economy, research manpower allocated to animals does not exceed 10 per cent of the total.

e- In all Arab countries, research manpower allocated to agricultural economics appear to be minimal. This area has received more attention in recent years in some Arab countries.

In conclusions, allocations of manpower to various areas of research are not based on priority determinations. In reviewing all available literature on the subject, the writer did not find any systematic plan for manpower allocations. In more recent developments, and as a result of some outside interventions,the following cases are cited as representing positive developments:

a- In the early eighties, Sudan started reviewing its manpower needs through a World Bank-USAID project, and took steps to strengthen research manpower in sugar cane, farming systems in Western Sudan, agricultural economics and animal wealth. Sudan was cited then as a glaring example of inconsistencies between the government developmental plans and the slow response of research organizations to such developments. While the government was going a head in putting more new land under sugar cane and ground nuts cultivation, the research system then had few in ground nuts but none in sugar cane. Plans of sugar cane plantations were perceived, executed and became operational, but with no comparable developments or plans in research effort. It was not until early eighties that outside agencies interferred and suggested the development of manpower in that field. The same may be said about the rainfed sector in Sudan including animal wealth.

Table (12)-Percentage allocation of research manpower (Ph.D and MSc holders) to various areas of research in eight Arab countries (1984-85).

Area of Research	Egypt	Iraq	Jordan	Morocco	Sudan	Syria	Tunisia	Yemen Al
1-Plant production(total)	27.3	40.4	29.0	41.8	43.7	42.6	23.7	43.9
1.1 Field crops	(9.0)	(17,3)	(16.1)	(19.8)	(20.0)	(27.8)	(12.4)	
1.2 Vegetables and fruits	(11.9)	(14.1)	(12.9)	(20.9)	(19.5)	(14.8)	(11.3)	
1.3 Others (mostly industrial crops	(6.5)	9.0	-	(1.1)	(4.2)	-	-	-
2-Plant protection: diseases, insects weeds and others	20.8	13.0	25.8	19.8	18.4	22.2	11.3	26.8
3-Animal production and health	16.5	9.6	9.7	8.8	6.3	11.1	14.4	-
4-Soils, water and irrigation(total)	19.2	29.5	12.9	13.2	7.4	14.8	21.7	19.5
4.1 Soils	(8.5)	(10.2)					(9.3)	
4.2 Water resources	(1.7)	(7.1)					(8.3)	
4.3 Irrigation	(9.0)	(12.2)					(4.1)	

Table(12)-Cont.....2

Area of research	Egypt	Iraq	Jordan	Morocco	Sudan	Syria	Tunisia	Yemen AR
5-Mechanization	1.1	3.8	-	-	2.1	-	1.0	7.3
6-Agricultural economics	3.8	2.4	12.9	2.2	3.2	-	8.3	2.4
7-Others	Desert res.:4.6	For-ages:1.3	For-ages:6.5	FTN:3.3	FT:12.1	FT:1.9	Forest-try:1.0	-
	CSS:6.6	-	Forest-try:3.2	CSS:11.0	CSS:6.8	For-ages:3.7	For ages:1.0	-
						Forest-try:3.7	CSS:17.5	

Abbreviations:CCS= Central support services, FTN= Food technology and nutrition, FT: Food technology

-See Annex(9)

b- In recent years and again in the eighties, Iraq,Morocco, and Yemen AR took steps to strengthen their manpower and organize it in national teams each concerned with an identified national program.

c- In several countries that include Egypt, Jordan, Morocco, Sudan and Tunisia, national teams of research tackling a national program in either cereals or legumes, were formed. Such developments were supported by donor agencies like IDRC,or by International Agricultural Research Centers like CIMMYT or ICARDA.

2.1.4 Allocation of aggregate expenditure on agricultural research in relation to value of agricultural domestic production: One indicator to measure national commitment to research is to evaluate the aggregate expenditure on research as a per cent of total value of agricultural production. For some countries like Egypt, Jordan, Tunisia and Morocco, total expenditure of agricultural research in institutions under ministries were obtained as actual figures. In other countries,estimates were made from available information on manpower, salary structure, operational costs and other expenses. The value of agricultural production was calculated from information on value of gross domestic production and the share of agriulture in that value. The picture for selected Arab countries is as follows:

Country	1.Value of gross agric. domestic production in 1984 (mills.US$)	2.Total agricultural expenditure (mills.US$)	Per cent 2 to 1
-Algeria	3041	3.0	0.10
-Egypt	6012	36.0	0.60
-Iraq	4688	16.0	0.34
-Jordan	274	1.0	0.36

Cont.			
-Morocco	4256	7.0	0.16
-Sudan	2220	8.0	0.36
-Syria	3186	5.0	0.15
-Tunisia	1041	5.0	0.48
-Yemen AR.	705	1.5	0.21

The above figures of aggregate expenditure do not include expenditure of agricultural research in universities. In most countries ,the expenditure does not match that in ministries. In looking at ratio of expenditure to value of domestic agricultural production, none of the countries exceeds one half per cent except Egypt. This level of expenditure is very low by any standard. If Arab countries opt to spend on agricultural research a value of one per cent, they have to double or triple their present level of expenditure.

2.2 Manpower in universities: The faculties of agriculture and vetrinary medicine in Arab universities employ the majority of manpower with higher qualifications. The distribution of such manpower by country is given in Table (13). The following is a comparison of aggregate figures of manpower working in universities and outside universities:

	Manpower in agricultural education and research					
	Universities			Research institutions outside university		
	Ph.D	MSc.	Total	Ph.D	MSc.	Total
-Egypt	2466	1310	3776	1318	1316	2634
-All other Arab Countries	1462	907	2369	485	841	1326
Total	3928	2217	6145	1803	2157	3960

Egypt alone employs 63 per cent of manpower qualified to the Ph.D level, and 59 per cent of the MSc. level of all Arab universities. When comparing manpower in universities with outside institutions, the universities employ more than double the number of Ph.D, and about the same number of MSc. holders.

In assessing the situation concerning the manpower in universities, the following points may be made:

a- The universities will continue to attract a larger number of Ph.D holders especially in countries where terms of employment are more attractive. In most Arab countries, faculties of agriculture are in the formative stages and will need larger numbers of staff. This situation is true in the newely-established faculties of agriculture in Algeria, Jordan, Oman, Saudi Arabia, Somalia, Syria, UA.Emirates, and Yemen AR. Under these circumstances, more efforts should be devoted to involve this manpower in national research effort.

b- At present, most of the time of staff members in universities is occupied with teaching. However, two points must be stressed regarding the potential of utilizing such manpower in research. These are:

- All staff members are required to carry out research for promotion. In this context, the possibility of channelling research efforts into the national plan has great potential.

- More universities are starting post graduate programs. Such development presents an excellent opportunity for utilizing research of graduate students in the national plan.

c- Vehicles, to involve staff working in universities in the national effort of agricultural research, must be sought and promoted. Among such vehicles are:

- The formation of national teams to carry out priorities, should be organized in well-formulated national programs.

- Staff members should be attracted to spend their sabatical years inside the country, or in other Arab countries. The sabatical year will be an opportunity to involve staff members in research being carried out in national institutions outside universities, and thus establishing linkages that may develop into more continuous relationship.

Table(13) Number , level of qualification and nationality of manpower working in faculties of agriculture and veterinary sciences in Arab countries (1985).

Country	Ph.D holders				MSc holders				Total Ph.D & MSc.
	N	A	F	Total	N	A	F	Total	
-Algeria	24	2	14	40	74	2	14	90	130
-Egypt	2466	-	-	2466	-	-	-	1310	3776
-Iraq	332	201	2	535	342	4	-	346	881
-Jordan	54	2	-	56	12	-	-	12	68
-Libya	40	78	2	120	77	43	-	120	240
-Morocco	49	-	35	84	152	-	28	170	254
-Saudi Arabia	17	105	34	156	8	7	5	20	176
-Sudan	132	-	-	132	78	-	-	78	210
-Syria	168	1	-	169	-	8	-	8	177
-Tunisia	28	-	4	32	32	-	4	36	69
-UA.Emirates	1	10	-	11	2	6	-	8	19
-Yemen AR.	3	2	-	5	1	-	-	1	6
-Yemen Dem.	20	2	-	22	17	1	-	18	40
Grand totals	3334	403	91	3828	2105	71	51	2217	6045
-Egypt				2466				1310	
-All other Arab countries				1462				907	

Abbreviations:-N:Nationals, A: Arabs, F:Foriegners.

3. Physical Facilities of Agricultural Research

There are two main features that have been found to be common among agricultural research facilities in Arab countries. The first being that the laboratories and central facilities are concentrated in headquarters of research institutions. Usually, the headquarters also house the largest number of qualified researchers. The second feature is the large number of experimental stations that are claimed to be under headquarter administration. Review of such facilities revealed the following:

3.1 Weakness of infrastructural facilities in stations: In countries that include Egypt, Iraq, Morocco, Syria and Tunisia, stations outside headquarters are usually understaffed, have inadequate research laboratories, and suffer from general support facilities.

3.2 The stations are too many to be properly maintained and operated with the allocated funds. Some of the stations may be needed to cover an agro-climatic area, but some may no longer be needed. Some of the new irrigation schemes in Algeria, Jordan, Sudan and Syria, do not have experimental stations to serve them. What is needed is to review geographic distribution of existing stations with the objective of perhaps:

- strengthening some;
- closing down some;
- and establishing new ones in the light of recent developments.

Reviews carried out in a number of countries in the last ten years suggested the following measures:

a- The establishment of two new stations in Sudan; one in the west, and the other in Rahd irrigation scheme. Measures also suggested to decrease the number of researchers in Wad Medani, an experimental station next to the Gazira scheme.

b- In Tunisia, there are at present twenty three experimental stations distributed all over the country. Recent reviews suggested the reorganization of these stations under six major centers, and strengthening the facilities in these six new centers in order to operate properly.

c- In Morocco, a situation was found to exist that was similar to Tunisia. The measure suggested was the strengthening of only twelve stations that serve major agricultural regions.

d- In Egypt, a deputy director for experimental stations was suggested in a move that reflects the new policy to strengthen regional work.

e- In Jordan, four new centers of technology transfer in rainfed areas were suggested in a move to create a balance in resource allocation between irrigated and rainfed regions in the country.

4. Research Programming

The organization of research programs are perhaps the most important element of the research system in Arab countries. Over the years, the element received greater attention both from donor agencies and national leaders. Considering the limited resources in both manpower and operational funds, it was concluded that the organization of research programs should be improved along the following criteria:

a- Consistency, between research programs and national development needs, should be increased and strengthened.

b- Research programs should be formulated along the lines of national priorities decided upon by research leaders, farmer leaders, decision-makers in the planning agencies, and other concerned parties especially recipients of research results other than farmers.

c- Research should be organized in the form of national programs, each concerned with a priority area identified in the national plan. Projects identified with individual researchers should hence be avoided or minimized.

d- Human, physical and financial resources from inside and outside, should be optimized to attain maximum efficiency in attaining objectives.

e- Programs of research should be evaluated periodically to screen out non-productive and non-relevant ones, and increase consistency between existing and future needs of the country and research programs.

f- Orientation of research should be oriented more toward commodity, rather than classical disciplines.

Having said the above, we may proceed to consider some of the more recent developments in this area. We'll present the information under the following topics: "national plans of research", and "number of projects in existing programs".

4.1 Of all Arab countries, only Egypt has announced a five-year plan of agricultural research. The plan (1982-87) was initiated by the Agricultural Research Center, but included projects in which faculties of agriculture, the National Research Center and other centers of research in the government were cited as participants. It was organized along sixteen major areas of research that included ten major national programs, each directed to improve the productivity of a major food commodity. The other six areas were disciplinary programs that cut across all major food commodities.

In reviewing the plan one comes out with the following:

a- The plan included a large number of projects. Each major area was subdivided into 5 to 21 projects, and each project is further sub-divided into 4 to 22 topics for research. The total number of research projects in the plan exceeded 200, and the topics identified for research exceeded 1500 ones.

b- The reviewer of the plan comes out with the impression that many old fragmented topics adopted by researchers persisted in the plan, inspite of classifying such topics under major national program.

c- Although the orientation of the plan was commodities like wheat, cotton, maize and rice, all topics of research under disciplines like plant pathology, soils, entomology were not integrated under the commodity. The plan as a vehicle for reorganization of research program, was not apparently strong enough to dissolve structural or administrative barriers of institutes. Several institutes were established along disciplinary lines, and hence the administrative structures persisted all along.

d- The plan did not have the most significant element, which is the resources needed for implementing each project. The resources needed to implement more than 1500 topics of research appeared to be beyond the available ones, especially in terms of operational funds. Many of the topics were listings of activities that researchers found necessary, without subjecting them either to priority settings or to a criterion of possibility of implementation.

e- Another significant weakness of the plan was the absence of monitoring and evaluation unit to ensure implementation and to review stages of target realization.

The features of research programming as they were summarized hereabove are not unique to Egypt. The situation in other countries as will be shown later is similar, if not worse.

4.2 In 1985, Iraq decided to organize research activities in all fields including agriculture. Steps to formulate a national research plan were taken. Staff in universities, agricultural research centers, in both the ministries and the Research Council, were invited to submit proposals for research. Again here, a large number of research projects were submitted reaching over 150 projects with more than 600 titles. In Morocco, World Bank officials in the early eighties, had great difficulties to convince leaders of agricultural research to focus their research effort into a small number of national programs. The Moroccoan leaders suggested 35 programs, while World Bank thought that the number of 12 programs was more consistent with the resources available. The dialogue went on when Morocco was negotiating a World Bank loan to support agricultural research in the country. In Tunisia, the number of research topics reported in the periodical publication of current research issued by the National Documentation Center for Agriculture in 1983 came to 242 research titles. The only time Sudan published a record of research titles was in 1981, and the number came then to more than 420. In conclusion, the number of research titles are far too many to be implemented by availalbe resources in a satisfactory manner. This is an area of research

management that warrants immediate review. It includes:research planning including priority determination based on defined criteria, optimization of resource allocation, monitoring of research implementation and evaluation of research performance.

5. Linkages:

The term linkages is used here to include all kinds of relationships among research systems. The relationship may be through cooperative program, membership in a regional network, or participation in a regional or an international center. It may be on a bilateral, regional or an international level. If linkages are important in any geographic area of the world, they are of special importance in the Arab region, where most of the countries are small. Many of the problems facing these countries are common, but most importantly the research systems have developed to a stage where linkages may become crucial to the success of research efforts in the majority of the countries. At present, one does not need to build a case for the importance of establishing such linkages among research systems. What is needed, however, is to identify vehicles or instruments for cooperation.

5.1 Survey of existing linkages:

5.1.1 Bilateral linkages: Traditionally, bilateral relationships have been developed between one Arab country and another, or one or more of the developed countries. Most of the known relationships come as a result of a technical assistance program. The relationship has been more or less a one-way street, through which a developed country will offer a technical assistance to strengthen the national research system. The components will be either one or a combination of training of nationals in the institutions of the developed country, the placement of experts in the Arab country for various periods of time, and the supply of equipments and other hardware needed for

research. All technical assistance programs of the United States, West Germany, United Kingdom and France were of this type. Unfortunately, the relationship between the national system in any one Arab country and those representing the developing country will terminate when the technical assistance program comes to an end. It is not the objective of this presentation to evaluate all of such technical assistance programs. However, the time may have come in many countries to build in these projects an element of continuity between the two parties, through which a more lasting relationship may be developed.

Bilateral relationships developed at the initiative of Arab countries themselves are very weak and hardly exist. There are some cooperative programs among groups of Arab countries that have been supported by outside agencies like ICARDA, and these will be discussed hereafter. All previous attempts to build bilateral research relationships have not materialized in any lasting form of cooperative programs. In the coming five years, Syria and Jordan will cooperate in a cooperative program that has a small element of research. The objectives of the program include pilot projects to utilize rain and underground water in the Hamad Basin and to develop grazing capacity of the region. The program will be supported by the Arab Fund.

5.1.2 Regional centers and networks:

The only Arab regional research center that has been established is ACSAD (the Arab Center for Studies of Arid Zones and Dry Lands). ACSAD is an institution established in 1972 under the Arab League, and has been mandated to work on the development of the arid and semi-arid regions. With its headquarters in Syria, ACSAD is an intergovernmental institution run by a board of directors representing all member countries. Except for Somalia and Djibouti, all Arab countries are party to ACSAD. As a regional center, ACSAD represents an experiment in cooperative effort, and must be evaluated with the view of identifying strengths and weaknesses of its work. It employs a limited cadre of researcher who implement two major programs, one in animal and the other in plant production.

Most of ACSAD'S experimental work is concentrated in Syria, but in recent years it has established links with other Arab countries. The program of ACSAD is approved by the board of directors,but has limited impact in Arab countries because of the limited financial resources.

The other more recent development is the initiative which the Near East Bureau of USAID has taken to establish a regional network for rainfed areas. This network which is called RAIN (Rainfed Agricultural Information Network), is still in its formative stages and has not taken its final shape,both organizationally and operationally.

The third body that has regional activities in research cooperation is the Union of Arab Scientific Research Councils (UNION). Established in 1978 in Baghdad-Iraq, the UNION promotes and supports research activities among Arab researchers in all fields with a priority in agriculture. The role of the UNION in supporting research has thus far been limited because of its limited funds.

5.1.3 Linkages with international research centers:

Arab national systems of research have strong relationship with a number of international agricultural research centers. The strongest relationships are with ICARDA (International Center for Agricultural Research in Dry Areas). Through its core program, and through the support of a third donor party, ICARDA has been able to establish a number of cooperative projects in the region. Notable among these projects are the faba bean in the Nile Valley, the legume program and the cereal program. The faba bean project is supported by an ICARDA/IFAD fund, and is implemented cooperatively by teams of researchers from ICARDA,Egypt and Sudan. The project is a good example of cooperative work between two Arab countries that was formulated, implemented, coordinated and supported by third parties.

The legume project is also coordinated by ICARDA and supported by IDRC. It is implemented in Syria, Jordan, Tunisia and Morocco. The cereal project is supported by the core budget of ICARDA,but has some supported elements in Jordan, Tunisia and Morocco.

The program has several elements, which include variety trials, exchange of information on all aspects of barley and wheat research, and regional workshops of researchers to discuss and exchange experiences.
Some Arab countries like Sudan, Yemen AR and Egypt have relationships with ICRISAT, mainly in the field of sorghum research . The Potato International Research Center (CIP) has a regional office in Cairo. Previously and especially before ICARDA took the regional mandate of wheat improvement in the Middle East, CIMMYT in Mexico had strong relationships with countries like Tunisia, Morocco, Jordan and Egypt.

5.2 Potentials of research linkages in the Arab region: Experience has proven that well-formulated projects with inputs from a third party are the most successful. Many Arab countries have developed their national base in research, but thus far, have been unable to optimize their capacities in regional cooperative programs. Although cereals and legumes are well covered by the multidimensional service role of ICARDA, other important areas need to be addressed through cooperative programs. The following are but few examples of the common problems:

a- The development of management programs to range lands including the use of solar energy.

b- The study of sand dunes movement and the development of projects to control desertification.

c- The control of virus diseases that travel through borders like those of vegetables and fruit trees.

d- The development of water management programs for irrigated areas, especially those in arid climates.

e- The development of regional study programs and information networks in fields like: food imports, the introduction of new species into arid climates, the use of recycled water for plant production, inland fish culture, water management techniques, soil management, plant disease outbreaks,sheep breeding, and environments that promote better income for farmers,as well as adoption of technology.

6. Outside Support to Agricultural Research

The countries of the region are divided into two categories with regard to sources of support to their agricultural research activities. The countries in the first category have managed so far,to support research activities from their own national resources. These countries include Iraq, Libya, Algeria, Saudi Arabia, Kuwait, Qatar, U.A Emirates and Oman. The second category includes countries that sought,over the years,outside support from various donor or developmental agencies. These are Egypt, Jordan, Tunisia Morocco, Yemen A.R., Somalia, Yemen Democratic, Mauritania,Syria and Lebanon.

The traditional sources of outside support to agricultural research in the Arab region are:

a- Bilateral or national technical assistance or cooperation agencies. These include:

- USAID (United States Agency for International Development).
- ODM (Overseas Development Ministry,previousely ODA) of the United Kingdom.
- BMZ (Federal Ministry for Economic Cooperation) of West Germany.
- Ministry of Cooperation and Ministry of Foriegn Affairs of France. In addition,France has two specialized organization that are publicly funded and carry out research of international scope. These are GERDAT (Study and Research Group for Development of Tropical Agriculture) and ORSTOM (Office of Overseas Scientific and Technical Research).

- CIDA (Canadian International Development Agency).
- ODA (Official Development Assistance) of the Netherlands, run by the Minister for Development and Cooperation in the Ministry of Foriegn Affairs.
- Other countries that have been involved to a lesser extent in the Arab region include Sweden, Japan and Australia.

b- Multilateral and regional organizations: The ones that are involved in the Arab region include:

- UNDP (United Nations Development Program)
- FAO (Food and Agriculture Organization)
- IFAD (International Fund for Agricultural Development)
- World Bank
- EEC (European Economic Community).
- AFESD (Arab Fund for Economic and Social Development).

c- The third category includes private, non-profit and autonomous institutions. Those who have been involved in providing technical assistance in agricultural research include:

- IDRC (International Development Research Centre)of Canada,
- Ford Foundation of the United States.
- In recent years, W.K. Kellog Foundation has shown some interest in the region.

6.1 Scope and size of outside support:
The level of support to agricultural research has been fluctuating over the past twenty five years. It is not the objective here to survey support to agricultural research given by each agency and in every individual country. Therefore, the remark concerning this topic are inteded as guidlines, and may be summarized as follows:

a- The level of support of certain agencies:Some agencies previousely known to support agricultural research in a major way, have considerably decreased their support in the last seven years. These include UNDP, FAO, the Ford Foundation and the ODM of Great Britain.

b- The geographic coverage of support agencies: Some agencies have traditionally been committed to certain countries more than others in the region. France, for example, have had a long history of technical support to both Tunisia and Morocco, and the United Kingdom to Sudan and Jordan. Only the United States has spread its program to a large number of countries, which are recipient to technical assistance. The size and geographic distribution of major donor agencies may be presented in a table from as follows:

Donor agency	Egypt	Jordan	Morocco	Somalia	Sudan	Syria	Tunisia	Yemen AR	Yemen Dem.
-Arab Fund	-	E	-	-	-	E	-	-	-
-IFAD	C	E	-	-	C	-	-	B	-
-World Bank((loans)	-	-	A	C	A	-	-	A	-
-IDA (soft loans)	-	-	B	C	B	-	-	B	-
-UNDP	-	-	-	-	-	-	-	-	C
-EEC	-	E	-	-	-	-	-	-	-
-IDRC	C	E	E	-	E	E	E	-	-
-USAID	A	A	B	B	B	-	B	B	-
-ODM	-	-	-	-	C	-	-	-	-
-France	-	-	C	-	-	-	C	-	-
-West Germany	-	E	-	-	-	-	-	E	-
-Italy	-	-	-	-	-	-	-	C	-
-USSR	-	-	-	-	-	C	-	-	C
-Ford Foundation	E	-	-	-	-	-	-	-	-

A: Major involvement more than 5 mill.US $/year

B: An average of 1-2 mill.US $/year

C: An average of 0.5 mill.US $/year

E: An average of 50-100 thousand US.$/year

Note: Above information is based on information available to author as a result of recent regional survey.

c- Priority given to agricultural research in the total assistance package:experience has shown that no explicit policy exists in determining the share of agricultural research in the total package of technical assistance received by any one country. Since most agencies are multipurpose, in the sense that they cover several sectors of recipient countries, the case for the support of agricultural support has been discussed along with projects of other sectors. There is evidence that the more the country articulates its case in dealing with donors,the more agricultural research receives priority. This element is of vital importance when considering the strengthening of the capacity of countries in the organization,planning and getting financial support to research. There is need in the region to develop methodologies and approaches to identify priorities of research, make a case for the support of research,and formulate research projects that promise to produce impact on productivity.

IV. OPPORTUNITIES FOR IDRC ACTIVITY IN THE ARAB REGION

1. General Features of Arab Agricultural Research System

The general review presented in this paper showed several features of Arab research systems that can be summarized as follows:

a- All Arab countries have invested in the building and developmen of research system. The level of funding, from both national resources and outside support, is below standards that are sugg sted by international agencies. World Bank and United Nation agencies suggested that levels of expenditure should reach at least one per cent of the value of agricultural domestic produc tion.

b- Arab research systems are diverse in organization, level of development in physical facilities, level and type of manpower, and in overall maturity and comprehensive coverage of research needs.

c- Arab research systems are also diverse in size. Some being very large like in Egypt, some medium like in Iraq and Sudan, while some are small like in Jordan, Yemen AR., Tunisia and Syria.

d- The gaps and areas that nominate themselves for an outside technical support agency are also diverse. However, these gaps or areas can be grouped into two main types:i)those that are characteristic to individual countries and ii)those that are characteristic to a group of countries i.e. of a regional nature Another grouping is made to the type and nature of support: i)support in the form of commodity project designed to strengthe one or more aspect of research elements on say wheat, chick peas, barley or sugar cane, and ii)support in the form of theme project designed to strengthen the overall functioning of the system. Strengthening management capacity, flow of information, and linkages of the national system with outside sources of knowledge fall in the latter group.

A third way of looking at support to research system is through the type of impact provided by such support. Perhaps the best way to picture support in this context is whether support has a quantative or a qualitative impact. Providing the research system with a car or a piece of equipment has a quantitative impact. Such support may be important for the performance of part of the system, but the impact lasts as long as the piece of hardware operates. However, supporting the system to strengthen tools of resource allocation to research, or to strengthen capacity of research evaluation, has a qualitative impact that cuts across all activities and has lasting effects. Needless to say that grouping types of support is not that easy. Support of one kind overlaps with the other.

With these introductory remarks, we propose to discuss opportunities open for IDRC activities in the Arab region under three categories:

a- The first being the type of support that applies to the majority of countries in major elements of research system. These major elements are: policy, planning, organization, manpower, physical facilities, linkages, management and operational funds.

b- The second being the type of support that applies to the majority of countries in major areas of research that has impact on priority areas (commodity research) .

c- The third being the type of support that applies to individual countries.

In all three categories, the size and scope of support consistent with IDRC must be kept in mind. IDRC is not in the business of a major institution building programs like USAID ,for example. IDRC is but one agency among others working in the region, hence its role must be coordinated with the other agencies working in the region.

2. IDRC Opportunities in Providing Support in the Arab Region

2.1 Support to strengthen elements of research system:

2.1.1 Policy, planning and organizational structure:Experience has shown that matters related to the three above elements,are not sensitive to outside support or interventions. Such elements are questions that should be resolved by the authorities in the country itself. How a country opts to organize its research system, is a question that has historical dimensions among other subjective and complicated circumstances. Such a question, usually reffered to as the institutional arrangement of research, has proven to be much more complex than what it appears on the surface. It is a question that can be resolved with the maturity of national system,and is best handled by the national decision-makers. Policy matters related to research, also mature with time. USAID and World Bank have addressed these matters in several countries but with little success. They are not matters that should not be touched by IDRC, but rather they are priority ones for the type of support IDRC offers. However, it is exremely important to consider how such matters influence the overall environment in a country that determines the efficiency of outside support.

Planning of research activities and identification of priorities and matters related to such function are worthwhile to be considered by IDRC especially in the overall context of research management Planning of research, however, is an activity that can be best initiated by the country itself. Any support,sought to strengthen capacity of a country to plan its research activity,should be examined by IDRC. However, IDRC role could best serve the country by providing help in improving methodologies, tools and manpower training.

2.1.2 Development of manpower: Common gaps existing in the type of manpower are in the fields of:(i)agricultural economics including syste analysis,and(ii)research management. By research management we mean:identification and formulation of research programs,budgeting of research projects, priority setting, monitoring tools,pre-evaluation methodologies, post-evaluation methodologies of research projects, plans of human development to meet changing needs,

development and management of physical resources especially experimental stations, management of financial resources and management of information services.
Most Arab countries have invested substantial sums of money in developing its human resources in commodity or classical disciplines. Most countries have adequate number of agronomists, pathologists, wheat researchers, horticulturists and soil scientists. However, there are great gaps in two fields that are needed to integrate or articulate research activities; namely economics and management. Whether support is in theme or project form, IDRC will do well to consider with favour the support of the development of human resources in these two fields, both at national and regional levels.

2.1.3 Development of physical resources: Physical resources include two main elements: i)buildings with offices, laboratories and general purpose halls, and ii)experimental stations with suitable service buildings and land for experiments. Most Arab countries, if not all, have their main buildings in the capital city, and this may or may not be appropriate. Facilities in the experimental stations have received less attention and investment. Again, most if not all, Arab countries have large number of experimental stations. Most experimental stations are multipurpose. They are used for experimental work, for the production of seeds or true seedlings, and for the distribution of one or more of the production inputs. Experimental plots are not tidy, they are not kept well, and in brief, they are not well-managed. The time has gone when an experimental station is needed in so many regions. In many countries, like Jordan, Syria, Egypt, Tunisia and Morocco, there is need to decrease the number of the so-called experimental stations. However, in a country like Yemen AR, there is still need for such multipurpose stations. An experimental station is thought of as a place in which good work is being carried out, and in which crops look clean, tidy and healthy. However, in the majority of cases, the farmers fields around the stations look better than the experimental stations.

What can IDRC do in this respect? The answer is very little, except in the promotion of sound criteria for geographic distrtibution of stations, promotion of sound management practices, and the development of criteria for the review of the country needs of experimental stations in the light of new developments in research methodologies and approaches. If the existing number of stations is not needed, and if the maintenance and proper running of all stations are beyond the resources available, then why should't each country carry out a review of its experimental stations? Some may be closed down, some may be strengthened. If a station was needed in early days to promote introduced technology, should it continue to function if the farmers no longer need such services? New approaches to adaptive research of crops, for example, speak of simulated environments, and modeling of production systems. Perhaps it is more economic for a country, with limited resources for research, to employ new approaches than to keep inferior facilities of research. Another element, which is of vital importance, is the fact that research systems have closed themselves with the bounderies of large number of experimental stations. The claim was that such stations were needed to have controlled conditions for experimental work. The result was that researchers did not benefit from on farm research, and hence, became somewhat isolated from farmers. Farmers did not come to experimental stations for various reasons, and if they came, they did not find impressive work. On the other hand, researchers did not go to farmers fields, thus limiting their work within the "walls" of the stations. This situation must be changed through the promotion of new experinces, new approaches, and new developments in the farmers fields. To deal with this situation, IDRC may do well to incorporate this element in its overall strategy to research support. It may also incorporate such needs in the regional activities of research management.

2.1.4 Support to operational funds: One of the characteristic features of research institution in many Arab countries (non oil-exporting countries are excluded except Algeria) is the low share of operational funds in the overall budget of agricultural research. Whenever there is a budget cut, operational funds are the first to suffer. The per cent of operational funds of total budget rarely exceeds 20 per cent. In some countries like Egypt, Jordan, Morocco and Sudan, operational budget comes close to ten per cent of the recurrent (non-capital) budget. Operational budget usually includes transportation, casual labour, purchase of equipemnt, purchase of materials,library materials and conference and meeting funds.

The issue of budget allocations has two dimensions or sides. The management of research budget lies on one side, and the government policies on the other. In many cases, the constraint of operational funds may be alleviated through proper management of research program. When budget cuts take place, all previously implemented projects share the limited funds available. The result usually is that all projects suffer. However, if priority criteria are applied,through which less priority projects are discontinued, the negative effects of cuts in operational funds may not be as bad. In summary, research management tools may allow research systems to perform better under budgetery constraints. The second dimension relates to government policies in employment. Research is looked upon in many countries as just another government service institution that absorbs employees. Once the employee is in, he cannot be dismissed even if his continued service impairs the performance of the institution. One aspect of this policy may be alleviated by organizing research into programs each with a defined plan and budget.

What can IDRC do in this respect? IDRC may look with favour to support operational funds only in projects with clearly defined priorities,and in fields that serve priority developmental areas in the country. IDRC cannot be a funding agency for operational funds in a research system as a whole. When a project is properly formulated, has a clear output, and has a clearly defined recipient of output, then IDRC may enter as a catalytic agent that ensures the project implementation.

2.1.5 Support to strengthen linkages of the system with outside sources of knowledge: Many of the Arab research systems are small. Perhaps Egypt is the only exception in this respect. In all cases, linkages of Arab national systems with each other, or with other outside sources of knowledge, are vital for the articulation of information flow. Linkages may be in the form of exchanging materials for research, they may be in the form of acquiring information that provide solutions to existing national problems, or they may merely be an exchange of information in research methodologies and experiences. Vehicles for such linkages could be the establishment of regional or international information networks in priority sectors of research, they could be in the form of membership in regional or international germplasm bank or they may be in the holding of regional or international seminars in a priority theme of research management on a sustained basis. Needless to say that strengthening vehicles to help national systems benefit better from services of international agricultural research centers, is on top of priorities of linkage development.
In this regard, IDRC should consider it a priority within their regional activities to support in linkages. IDRC may provide support in partnership with others, or they may initiate some activities by themselves. The form of support may be one or more of the following:

a- Support of a publication or newsletter on one of the priority research sectors of the region (see regional priorities of research areas). In this respect, IDRC should take note of the already existing publications like: AGRIS of FAO, RACHIS (Wheat,Barley and Triticale Newsletter) of ICARDA, FABIS and LENS of ICARDA (already supported by IDRC), Plant Protection Bulletin of FAO for the Near East Region, and the possibility of USAID starting a newsletter on rainfed agriculture.

b- Support of a series of regional seminars on selected topics of research management.

c- Support of publications on opportunities for linkages with national, regional and international sources of information, to be published in Arabic and English. The objective of such publications is to guide researchers on sources of material and knowledge already available on topics that are of priority to the region.

2.2 Support to strengthen commodity research on a regional or sub-regional level:
What is meant here is the opportunities for IDRC to support research projects designed to be implemented on regional or subregional level.

2.2.1 Cereals and legumes in rainfed areas: Cereals, especially wheat and barley, are two major commodities in the Arab region. Legumes, like chick peas and lentils, are not major commodities, but they are basic in the nutritional patterns of the people. Both of these commodities are covered on a regional basis by ICARDA, in cooperation with two sister institutions namely ICRISAT and CIMMYT. What is well covered, in particular, is the breeding of all major commodities. IDRC support in this area should be limited to strengthen national capacity to benefit from services provided by the centers. Support for breeding on a national level should be the lowest priority area.

2.2.2 Water management including supplementary irrigation in rainfed areas: This is a major regional priority directly linked with the ability of countries of the region to minimize their food gap. Water management means the optimization of water usage to obtain maximum crop output per cubic meter applied in the field. The problem has many dimensions. The details of each dimension are beyond the scope of this paper . However, one dimension will be discussed here because of its critical role:

a- Supplementary irrigation regimes in rainfed areas:Traditionally, adding water for irrigation was strictly thought of in the region as being in the Summer months or for producing crops under complete and continuous irrigation regimes. Rainfed areas receiving 250mm or above, were not thought of as recipients of irrigation waters in the months of late Fall, Winter and early Spring months. During these months cereals (wheat and barley)and legumes are usually grown. What is proposed here is the promotion of the development of irrigation regimes to supplement irrgular and fluctuating water supply from rainfall. The problem should be studied in an integrated approach in order to maximize the output of the land resource, but in particular,to ensure the cultivation of the benefits of modern technological inputs known only to work above a minimum level of soil moisture.IDRC will do well to support the initiation of this effort on a regional or a subregional level, particularly in countries like Morocco, Tunisia, Syria, Jordan, and Algeria.

b- The role of IDRC in the other dimensions of water management may be in the promotion of establishing a regional center for water management, or perhaps in partial support of such a center.

2.2.3.System analysis as a tool to improve policy decisions:The economic, social and physical environment, under which farmers of the Arab region make decisions, are poorly understood by both researchers and decision or policy-makers. System analysis of agricultural sectors, aimed at identifying constraints of various types faced by farmers, is a badly needed area. IDRC may do well by launching a series of studies in selected countries of the region. Such studies may have a multidimensional positive impact on the overall performance of the agricultural sector. Shoman Foundation supported such studies in both Jordan and Sudan. A similar study may be carried out for Tunisia Morocco and Egypt.

2.2.4 Vegetables and fruits: All Arab countries are doing well in the support of research in this area. The only regional problem that may be considered for support by IDRC is the dynamics and biology of the relatively new virus disease known as Tomato Yellow Leaf Curl Virus (TYLCV). The Virus has spread throughout the region and is causing considerable losses to the tomato crop.

2.2.5 Desertification, range management and sand dune movement: There are regional problems that have been tackled and promoted by organizations like UNEP, ESCWA and the Arab Fund. Several bilateral and regional donor agencies are providing support to several countries of the region in one or more aspects of the problem (Australia and EEC to Jordan, Arab Fund to Syria and Jordan, USAID to Sudan, ACSAD to Yemen Democratic, and USAID to Morocco). IDRC can do little in this area.

2.2.6 Animal improvement: Previous efforts to support research on a regional effort in this area were discontinued. Ford Foundation started a program on sheep improvement as part of its ALAD program. ALAD was taken over by ICARDA, but its sheep component was stopped. In this field, IDRC role on a regional level is difficult to formulate. Furthermore, the size of support needed may be beyond IDRC scope.

2.2.7 Successful case studies in the region: IDRC may consider the support of documenting some success stories in the Arab countries as case studies. The case study may highlight the ingredients of the program that lead to the success of the research activitie and the application of its results. One case in point, is the spread of plastic agriculture in the Jordan Valley. The second may be the citrus industry in Morocco, the third may be the range management and sheep development in Syria. Research in these cases may be developed within the country or may be adopted. Such cases may show, both researchers and decision-makers, the integrated nature of a successful story of technology development, its transfer and its application.

2.3 Support to strengthen individual national systems:

2.3.1 Algeria: Algeria has gone through several reorganizational excercises in their research institution. Six months ago, research was implemented by commodity or sectorial centers, all organized under the Ministry of Higher Education and Scientific Research. In as far as agricultural research is concerned, two main institutions were involved i.e. the National Agricultural Institute at Al-Harash (now under Ministry of Higher Education and Scientific Research), and the National Institute of Agricultural Technology organized under the Ministry of Agriculture. Water research is under the National Center of Water and Land Reclamation organized under the Ministry of Water Resources. The Institute of Agricultural Technology is an umbrella organization, which runs central laboratories in the capital. The laboratories are for soil and water. All research activities are carried in stations distributed throughout the country, and researchers are part of the manpower organized under what is called Centers of Agricultural Development. Theses centers, which have changed names over the years, provide a package of services that include adaptive research, extension, distribution of agricultural inputs to cooperatives and state farms, and a number of government regulatory functions.

a- Areas of weakness:

a-1 The agricultural research "system" in Algeria is not organized in idependent units. According to recent decisions taken by the country's ruling party, research has become organized in units that are attached to the universities. Research in the Ministry of Agriculture is thought of as a function integrated with other functions. There is need to reorganize agricultural research so that proper evaluation of the system is possible.

a-2 Manpower: This is perhaps the weakest element as Algeria suffers from shortage of a well-trained manpower. Most trained personnel work in the teaching institutes to produce trained manpower. A large number of BSc. graduates have been produced, but few have gone to higher studies.

b- Performance of the overall research system . The government recognizes the shortage of trained manpower needed for research. There is no explicit plan to strengthen research. Perhaps the most needed assistance is in the overall review of the system in order to produce a plan of action showing organizational structure, priority areas of program, plan for manpower development, physical facility development, distribution of experiment stations, and management needs including evaluation and monitoring unit.

2.3.2 Morocco: During the last four years, Morocco has taken several steps to strengthen their agricultural research system. These steps include:

a- The implementation of a major program to build manpower through a USAID technical assistance program.

b- The consolidation of the research program into national research projects,each dealing with priority commodity or basic displinary service. The activity was carried out in cooperation with the World Bank. Efforts of the World Bank to promote the establishment of an evaluation and monitoring unit within the research system has not been fully fruitful yet.

c- The passing of a legislative act giving the National Institute of Agricultural Research a more autonomous status. In the begining of this year 1986, researchers in the Institute were given a raise in salaries in an attempt to encourage continuity of service and to stop the attrition rate of researchers leaving the institute to other service sectors of the country. Qualified researchers were being drained to

research units in major irrigated projects supported by the World Bank where higher pay and better working environment was available, to the private sector, and to educational institutes of agriculture where higher pay was offered.

d- The implementation of a major review of the agricultural research system carried out by ISNAR in 1984-1985. In 1986, the results of the review were finalized and published. These results contained recommendations and plans of action with regard to:

d-1 Manpower development plan consistent with major areas of research needed by the country.

d-2 Consolidation of the experimental stations into a small number and the strengthening of such stations. This was in concurrence with previous government actions to transfer research manpower and facilities from the capital Rabat, to the regions where irrigated developmental projects have been carried out. Government actions in this respect were part of the World Bank supported projects.

d-3 Improvement of linkages between research in the institute and the King Hussan Institute for Agricultural and Veterinary Sciences on one hand, and between the two institutes and farmers, cooperatives and marketing companies (citrus) on the other.

d-4 The improvement of research management procedures.

All of above measures were taken to deal with points of weaknesses.

The special needs of research in the country may be summarized as follows:

a- Modelling of environmental conditions in each major agricultural region, and the development of land use pattern most suitable to each region. Such measure may alleviate the risks and stress effects of drought.

b- Supplementary irrigation regimes to wheat, especially in areas where one or two irrigations may make the difference between a good or a bad harvest season.

c- More attention should be given to systems of managing small land holdings. Consolidation of a number of farms in management, but not in ownership, may lead to more productive resources. This requires an integrated system approach in which multidesciplinary research team will participate.

d- Morocco, like many other countries of the region, has given more priority to services provided to export crops like citrus, and to irrigated areas cultivated with sugar beet and other summer crops. In recent years, some rainfed rural development projects were launched through the support of USAID and other donor agencies. The element of socio-economic research has been quite weak in these projects.

e- There is great need to promote vehicles that allow clients of research to participate in the identification of research problems. An excellent vehicle in Morocco, is the Citrus Exporting Organization. The organization does not only participate in the identification of researchable topics, but it also supports the research carried out to solve them. If more commodity groups are organized like vegetable growers, poultry growers, sheep owners and wheat growers, research activities will become more relevant to the clients needs.

f- A special unit in the research system should be organized to monitor advances and technology developments made in other countries. This unit should screen information available from outside, and improvise mechanisms to apply them directly or, subjecting such information to minimal adaptive research. What we are saying here is that, the flow of information from outside should be institutionalized in order to maximize benefits to the clients of research.

g- Great opportunities exist to strengthen the role of staff working in King Hassan Institute of Agriculture and Veterinary Sciences in the national system. Staff in this institute claim that research being carried out is relevant to the needs of the country. Others outside the institute do not agree to that. The National Center for Planning and Coordination of Research has been recently established. A stronger arrangement to integrate research done in King Hassan Institute into the national system is needed. Such arrangement may be supported through the newly established National Center.

2.4.3 Tunisia: Weaknesses of research in Tunisia are somewhat similar to those in Morocco. Morocco, however, has been more responsive to deal with the organizational and general performance weaknesses than Tunisia. Tunisia opted to establish small institutes and centers,each dealing with a particular commodity or area of research. Although most of such institutes are under the umbrella of the Ministry of Agriculture, the administrative and physical barriers created by such institutional organization have been both expensive to the country and obstructive. Tunisia, for example, identified a weakness in the nationa research effort directed to olive culture. In response to this need, the Ministry of Agriculture decided to establish an olive research center. The newly created unit was the ninth in the family of institutes, centers and offices dealing with research in the agricultural sector. All previous efforts to consolidate such organizational units under one institution have not been successful. As we have said before, this issue is not for IDRC to solve, it is for the Tunisians to tackle. For when thinking of providing support, and which institution to be supported, a donor agency like IDRC will be confused with whome to deal. Before leaving Tunisia, it should be stressed that what was presented under Morocco applies very much to Tunisia. However, some of the problems are more acute in Tunisia. Some examples are:

a- More and more of the qualified personnel are leaving research in the Ministry of Agriculture to go either to educational institutions within the country, or to institutions abroad. In the past,

Tunisians knowing only French as their second language had limited job opportunities outside. When Tunisians started mastering English as their second or third language, more opportunities became open for those who opt to leave the country.

b- Linkages among institutions within the country are quite weak. Support to streamline research done at the higher institutes of agricultural education is fruitful.

c- The use of brackish water in agricultural production has received great attention through the institute which was supported by the UNESCO at one time. A case study should be supported to examine constraints that faced application of results obtained.

2.4.4 Egypt:Egypt research suffers from a system of centralization and bureaucratization more than any other country of the region. The number of researchers has jumped dramatically in the last ten years, with no parallel systemization of human resource allocation, and with no decentralization of regional distribution. Egypt may need many inputs to strengthen its research system, but the number one priority input is research management.
The priorities within research management are:

a- The evaluation and the recognization of priorities of research program, in order to produce consistency between the real needs of the Egyption agriculture and the research program. There is a lot of research being carried out in many Arab countries,but in particular in Egypt, research was not subjected to proper criteria of evaluation. One of these criteria should be whether such research is productive or not, and whether such research is needed in the first place or not.

b- The optimal utilization of physical facilities and operational funds available by an optimal number of competent research teams should be examined. One is struck with the distorted orientation of research resources available to Egypt, and one wonders whether they are being used to serve national objectives or individual vested interests. Some vested interests may coincide with national objectives,but the criteria for the utilization of resources should stress national needs and objectives first and foremost.
The author feels very strongly about the importance of research management issues. Addressing such issues should precede any other need that Egypt may have in order to strengthen the performance of the research system. Outside support should be concentrated in this area, and any contribution or improvement in this area will surmount any other.

2.4.5 Jordan: Jordan should be reviewed by many donor agencies as a testing ground to try to innovative ideas in research support. Among the ideas that may be supported are:

a- Support to organize a commodity group to go into an agreement, say with the Faculty of Agriculture, to carry out research needed by the client group. The commodity may be: wheat, and the subject:supplementary irrigation regimes in rainfed areas. It could also be:inland fish culture, and the subject: management and production system.

b- Like many other countries, especially Tunis and Morocco, the more qualified manpower is in the University. The University has just established a Faculty of Graduate Studies. A program to strengthen training of manpower in the Ministry of Agriculture may be partly supported. Fields that need strengthening is agricultural economics, water management and small farm management systems.

c- Jordan may be a good candidate country in which research management seminars may be held especially at a regional level.

d- Jordan has just started a major program to organize service packages of technology in rainfed areas. The program, which is supported by USAID, has a component to establish a research and technology transfer center with a headquarter in the vicinity of Amman (the capital) and with four regional service "centers" or "stations". The program will use the approach of system analysis of production systems in rainfed areas, identify constraints, and attempt to develop a package of measures to over come such constraints. Monitoring such an activity is a worthwhile excercise to see if a breakthrough could be made in improving productivity in an area typical of many in the region.

2.4.6 Syria: All attempts made thus far to consolidate agricultural research activities into a national center of research with higher degree of autonomy, have not been successful. The fact that both ICARDA, an international research center, and ACSAD a regional center, are both situated in Syria may have influenced decision makers not to give priority to the issue of consolidating research efforts. ICARDA is carrying out much of its trials in the Aleppo area plus other regions. ACSAD is doing the same. The Soviet Union is managing a big farm in the Euphrates basin with some experimental work on irrigated systems with cereals, sugar beets and cotton being the main crops in the production system.
ICARDA has already started some research in supplementary irrigation of wheat cultivated in rainfed areas. This type of work should be strengthened to cover areas other than the Aleppo areas.

Pherhaps the best approach to support research in Syria is through regional programs, especially in the field of research management.

2.4.7 Iraq: Iraq has a strong stock of research manpower. During 1986, a national activity to formulate a national plan of research including agriculture was started. It was evident that Iraq needed help in some research management issues, especially in establishing criteria of pre-and post evaluation of research projects. At present, Iraq may best be supported through regional programs.

2.4.8 Yemen Arab Republic (Yemen A.R): Many support activities are going on in Yemen AR. USAID is providing a major assistance program to establish a faculty of agriculture. The government, in cooperation with IFAD, World Bank and other donor agencies is committed to the establishment of a consolidated agricultural research service headquartered in Taiz . Yemen AR may benefit a great deal from other experiences in the region, while they are just begining to establish their agricultural service institutions. Qualified manpower is still scarse in all disciplines. Those who have been trained to work as researchers in the newly established Agricultural Research Authority are begining to move to Sana to join the newly established Faculty of Agriculture. It looks like what has happened or has been happening in many countries of the region is also going on at present in Yemen AR. Conditions of work in the University are more attractive to Ph.D holders, and hence those working in the Authority now will eventually move to the University.USAID is supporting the training of a number of graduates to the Ph.D levelin various disciplines. The demand on such qualified manpower in the University is much more than what the training program may provide. Therefore, research activities should be strengthened at the University. Alternatively, an incentive program may be designed to keep qualified researchers in the Authority.

IDRC has great opportunity to play a role in Yemen AR. The opportunity may not be in the area of major support, but in the area of developing vehicles to Yemeni scientists to benefit from experiences in the region.

2.4.9 Sudan: Sudan has had and still has one of the best developed manpower in the region. Over the years, hundreds and hundreds of research papers have been published in agricultural sciences in reputable journals around the world. Since the mid-seventies and until 1985, several reviews were carried out to identify strengths and weaknesses of Sudan agricultural research system. Major support programs were provided to establish stations in new areas (western Sudan is an example), to consolidate research administration in Khartoum, and to reorganize research programs. Agricultural Research Corporation (ARC) is now a consolidated organization of research. The big question is:what can be done to make Sudan's ARC a more productive institution?. During the late seventies and early eighties, the World Bank togather with other donor agencies including USAID, ODA and IFAD,launched together with the Sudanese government a major program to strengthen agricultural research system in Sudan. Gaps in manpower development were identified, and plans were made to deal with them. The system was provided with major support to establish new stations. Researchers, however, kept asking for more equipments to do more research. One of the elements of the research support program was the establishment of a research management unit to plan, monitor and evaluate research programs. The establishment of such a unit was not costly. Certainely, it was less costly than establishing ARC headquarter building in Khartoum. However, no research management unit was established then, and no research management is in place now. The objective of the research management unit was to screen the hundreds of research projects and reorganize them into few national programs dealing with critical problems facing the performance of agricultural sector in Sudan. On top of the national programs proposed was a socio-economic element to analyse the low level of productivity attained by most Sudanese farmers. This

aspect of Sudanese research needs is still valid and has top priority. What can IDRC do to help? The answer still lies in strengthening research management tools to reorient research efforts to critical problems. What is needed most is to change the approach used by Sudanese researchers on what is actually needed. What is needed is not research that can be published in international journals,but research that tackles constraints that have lead to the deterioration of performance of the agricultural sector. In brief, what Sudan needs now is not more researchers, not more stations and certainly not more equipments, but a basic change in the identification, formulation and evaluation of research activities.

-ANNEXES-

Annex(1)-Population of Arab countries:present (1984),estimated (1986),and projected (1990, 1995,2000).

Country	Population (millions)	Average annual growth of population (Per cent)		Estimated population (millions)	Projected population (millions)		
	1984	1973-84	80-2000	1986	1990	1995	2000
-Algeria	21.2	3.1	3.3	22.6	25.8	30.3	35.6
-Bahrain	0.41	3.9	3.8	0.44	0.52	0.61	0.69
-Djibouti	0.36	2.8	3	0.38	0.42	0.50	0.6
-Egypt	45.9	2.6	2.2	47.9	52.3	58.3	65
-Iraq	15.1	3.6	3.5	16.2	18.6	22.1	26.2
-Jordan(East+ West Banks)	3.4	2.8	4.0	3.7	4.3	5.2	6.4
-Kuwait	1.7	5.8	3.5	1.8	2.1	2.5	3
-Lebanon	2.9	3.3	2.9	3.1	3	3.3	3.6
-Libya	3.5	4.1	4.0	3.8	4.4	5.4	6.6
-Mauritania	1.7	2.1	2.7	1.8	2	2.3	2.6
-Morocco	21.4	2.4	2.4	22.4	24.7	27.8	31.3
-Oman	1.1	4.5	3.0	1.2	1.3	1.5	1.8
-Qatar	0.29	3.4	3.0	0.3	0.35	0.41	0.47
-Saudi Arabia	11.1	4.9	3.7	11.9	13.8	16.6	19.9
-Somalia	5.2	2.8	3.0	5.5	6.2	7.2	8.3
-Sudan	21.3	2.9	2.9	22.6	25.3	29.2	33.7
-Syria	10.1	3.4	3.4	10.8	12.3	14.6	17.2
-Tunisia	7.0	2.4	2.3	7.3	8	9	10
-UA Emirates	1.3	10.7	3.8	1.4	1.6	2	2.4
-Yemen AR	7.8	2.8	2.8	8.2	9.2	10.7	12.1
-Yemen Dem.	2.0	2.3	2.5	2.1	2.3	2.6	3
Totals	184.76		2.9	195.4	218.5	252.1	290.5

Sources:1-The World Development Report, 1986. The World Bank

2-World Population Prespects, 1982. The United Nations

Annex(2) Per cent of population of working age (15-64 years) for the years 1965 and 1984,and percentage of labour force in agriculture, industry and services for 1965 and 1980.

Country	Per cent of population of working age (15-64 yrs)		Percentage of labour force					
			Agric.		Indust.		Services	
	1965	1984	65	80	65	80	65	80
-Algeria	50	49	57	31	16	27	26	42
-Bahrain	47	65	-	-	-	-	-	-
-Egypt	54	57	55	46	14	20	30	34
-Iraq	51	50	50	31	20	22	30	48
-Jordan (East+ West Banks)	51	48	36	10	26	26	37	64
-Kuwait	60	57	2	2	34	32	64	67
-Lebanon	51	57	28	-	25	-	47	-
-Libya	53	52	40	18	21	30	39	53
-Mauritania	52	53	90	69	3	9	7	22
-Morocco	50	52	62	46	15	25	24	29
-Oman	53	53	62	50	15	22	23	28
-Qatar	63	63	-	-	-	-	-	-
-Saudi Arabia	53	54	68	49	11	14	21	37
-Somalia	49	52	81	76	6	8	13	16
-Sudan	53	52	82	71	5	7	13	22
-Syria	46	49	52	32	20	32	28	36
-Tunisia	50	56	49	35	21	36	29	29
-UA Emirates	59	67	20	5	32	38	47	57
-Yemen AR.	54	51	79	69	7	9	14	22
-Yemen Dem.	52	51	54	41	12	18	33	41

Sources:1- World Development Report,1986. The World Bank.

2- World Population Prospects as Assessed in 1982. A report published by The United Nations.

Annex(3)-Distribution of population by age groups in Arab countries for 1985, 1990, 1995 and 2000

Country	All ages (1000)	Age groups (%)				
		0-14	15-19	20-24	25-64	65 & above
1. Algeria						
1985	21993	45.9	11.1	9.0	30.4	3.5
1990	25989	45.6	10.8	9.3	3.1	3.2
1995	30501	45.0	10.4	9.1	32.4	3.1
2000	35194	43.2	10.9	8.9	33.7	3.3
2.Bahrain						
1985	431	33.1	8.1	9.8	47.1	1.9
1990	518	32.6	7.7	8.3	49.4	2.1
1995	606	32.0	7.3	7.8	50.7	2.3
2000	688	29.9	8.4	7.4	51.9	2.3
3.Egypt						
1985	46800	39.4	10.3	9.5	36.5	4.3
1990	52716	40.2	8.7	9.0	37.7	4.4
1995	58931	38.3	10.8	7.7	38.8	4.5
2000	65200	35.9	10.7	9.6	39.0	4.7
4.Iraq						
1985	15676	46.4	10.5	8.7	31.7	2.7
1990	18.457	45.5	10.7	8.9	32.2	2.7
1995	21553	43.8	11.1	9.1	33.1	2.9
2000	24926	41.9	10.1	9.5	34.4	3.1
5.Jordan						
1985	3527	48.1	11.7	9.4	28.0	2.8
1990	4279	47.5	11.2	9.6	29.1	2.6
1995	5249	48.4	10.1	9.1	29.8	2.6
2000	6400	48.8	10.1	8.3	30.2	2.7

Annex(3) - Cont 2

Country	All ages (1000)	Age groups (%)				
		0-14	15-19	20-24	25-64	65 & above
6.Kuwait						
1985	1789	41.4	9.1	8.8	39.2	1.5
1990	2187	40.3	9.1	8.4	40.5	1.7
1995	2583	38.7	10.0	8.1	41.0	2.3
2000	2968	36.8	10.1	9.0	41.3	2.9
7.Lebanon						
1985	2668	37.4	12.2	9.6	35.6	5.2
1990	2969	35.3	11.4	10.9	37.3	5.2
1995	3291	34.7	9.6	10.2	40.0	5.5
2000	3616	33.8	9.3	8.7	42.5	5.8
8.Libya						
1985	3604	46.5	10.2	7.8	33.2	2.3
1990	4327	45.9	10.6	8.5	32.6	2.4
1995	5155	45.5	10.5	8.9	32.6	2.6
2000	6072	44.7	10.7	8.8	33.0	2.8
9.Mauritania						
1985	1887	41.7	10.2	8.6	32.0	2.8
1990	2202	47.0	10.2	8.4	31.6	2.8
1995	2571	47.1	10.3	8.5	31.2	2.8
2000	2999	47.0	10.6	8.6	31.1	2.7
10.Morocco						
1985	23602	45.6	10.7	9.6	31.1	3.0
1990	27575	44.7	10.8	9.0	32.6	2.9
1995	31853	43.2	10.9	9.2	33.6	3.1
2000	36325	40.7	11.2	9.4	35.2	3.4

Annex(3) - Cont 2

Country	All ages (1000)	Age groups (%)				
		0-14	15-19	20-24	25-64	65 & above
6.Kuwait						
1985	1789	41.4	9.1	8.8	39.2	1.5
1990	2187	40.3	9.1	8.4	40.5	1.7
1995	2583	38.7	10.0	8.1	41.0	2.3
2000	2968	36.8	10.1	9.0	41.3	2.9
7.Lebanon						
1985	2668	37.4	12.2	9.6	35.6	5.2
1990	2969	35.3	11.4	10.9	37.3	5.2
1995	3291	34.7	9.6	10.2	40.0	5.5
2000	3616	33.8	9.3	8.7	42.5	5.8
8.Libya						
1985	3604	46.5	10.2	7.8	33.2	2.3
1990	4327	45.9	10.6	8.5	32.6	2.4
1995	5155	45.5	10.5	8.9	32.6	2.6
2000	6072	44.7	10.7	8.8	33.0	2.8
9.Mauritania						
1985	1887	41.7	10.2	8.6	32.0	2.8
1990	2202	47.0	10.2	8.4	31.6	2.8
1995	2571	47.1	10.3	8.5	31.2	2.8
2000	2999	47.0	10.6	8.6	31.1	2.7
10.Morocco						
1985	23602	45.6	10.7	9.6	31.1	3.0
1990	27575	44.7	10.8	9.0	32.6	2.9
1995	31853	43.2	10.9	9.2	33.6	3.1
2000	36325	40.7	11.2	9.4	35.2	3.4

Annex(3)-Cont.....3

Country	All ages (1000)	Age groups (%)				
		0-14	15-19	20-24	25-64	65 & abov
11.Oman						
1985	1228	44.2	9.0	8.1	36.3	2.4
1990	1434	45.0	9.4	7.5	35.8	2.5
1995	1655	44.7	10.5	8.0	34.3	2.6
2000	1908	43.3	11.0	8.9	34.0	2.8
12.Qatar						
1985	300	34.3	7.7	8.7	46.7	2.7
1990	353	35.1	8.2	7.1	47.0	2.6
1995	409	36.2	8.6	7.3	44.5	3.4
2000	468	37.2	8.8	7.3	42.5	4.3
13.Saudi Arabia						
1985	11129	43.2	9.6	8.6	35.9	2.7
1990	13506	43.3	9.6	8.4	36.0	2.7
1995	16048	43.1	10.0	8.3	35.9	2.8
2000	18865	42.6	10.1	8.6	35.8	2.9
14.Somalia						
1985	5552	43.7	10.1	8.6	33.6	4.0
1990	5887	45.9	9.4	8.4	32.1	4.3
1995	6236	46.5	10.4	7.8	31.1	4.2
2000	7079	44.8	11.6	8.9	31.0	3.8
15.Sudan						
1985	21550	45.1	10.2	8.6	33.3	2.8
1990	24895	45.1	10.3	8.6	33.2	2.9
1995	28703	44.5	10.6	8.7	33.2	2.9
2000	32926	43.5	10.7	9.1	33.7	3.1

Annex(3)-Cont.....4

Country	All ages (1000)	Age groups (%)				
		0-14	15-19	20-24	25-64	65 & above
16.Syria						
1985	10581	48.1	10.4	9.6	29.1	2.9
1990	12784	48.3	10.5	8.5	29.9	2.8
1995	15341	47.7	10.7	8.7	30.1	2.9
2000	18101	45.7	11.2	9.0	31.1	3.0
17.Tunisia						
1985	7209	39.6	11.6	10.0	34.5	4.3
1990	8078	38.1	10.5	10.2	36.8	4.3
1995	8921	35.7	16.7	9.4	39.6	4.6
2000	9725	33.0	10.4	9.7	42.0	4.9
18.UA.Emirates						
1985	1312	30.7	6.8	8.5	50.5	3.5
1990	1553	30.8	7.6	7.1	52.0	2.5
1995	1748	29.7	8.3	7.3	51.7	3.0
2000	1916	27.6	9.0	7.8	51.8	3.8
19.Yemen AR						
1985	6548	45.3	11.0	9.2	31.1	3.3
1990	7466	44.8	11.1	9.3	31.5	3.4
1995	8588	45.1	10.3	9.3	31.9	3.4
2000	9857	44.6	10.6	8.8	32.7	3.5
20.Yemen Dem.						
1985	2124	45.2	11.1	9.5	31.5	2.7
1990	2456	44.6	11.1	9.4	32.2	2.8
1995	2862	45.0	10.1	9.3	32.8	2.8
2000	3309	44.5	10.4	8.5	33.6	3.0

Source:World Population Prospects, as Assessed in 1982-United Nations.

Annex(4) Per cent urban population in Arab countries for 1965 and 1984.

Country	Per cent urban population		Per Cent
	1965	1984	Change
-Algeria	32	47	47
-Bahrian	-	-	-
-Egypt	(41)	(45)	10
-Iraq	51	70	37
-Jordan (East+ West Banks)	47	72	53
-Kuwait	75	93	24
-Lebanon	49	-	-
-Libya	29	63	117
-Mauritania	7	26	271
-Morocco	32	43	34
-Oman	4	27	575
-Qatar	-	-	-
-Saudi Arabia	39	72	85
-Somalia	20	33	65
-Sudan	13	21	62
-Syria	40	49	23
-Tunisia	40	54	35
-UA Emirates	56	79	41
-Yemen AR.	5	19	280
-Yemen Dem.	30	37	23

-Note:-Figures between brackets are for 1983 not 1984

Source:World Development Report, 1986. The World Bank

Annex(5)-Some basic economic indicators for Arab countries (1984): gross national production(GNP), gross domestic production GDP, per capita income and distribution of GDP by sector.

Country	GNP per capita (US $)	GNP (mills.US $)	GDP (mills.US $)	Distribution of GDP (%) Agriculture	Industry	Manufactur.	Services
-Algeria	2410	51,092	50,690	6	53	-	41
-Bahrain	10480	4265	4846[B]	1	-	-	-
-Djibouti	1424	513	513	3	-	-	-
-Egypt	720	33,048	30,060	20	33	-	48
-Iraq	3105	46,886	46,886	10	-	-	-
-Jordan	1570	5338	3430	8	30	15	62
-Kuwait	16720	28,424	21,710	1	58	8	41
-Lebanon	1240	3596	3596	9	-	-	-
-Libya	8520	29,820	30,570	2	64	4	34
-Mauritania	450	765	660	30	27	-	42
-Morocco	670	14,338	13,300	17	32	17	51
-Oman	6490	7139	7680	3	-	-	-
-Qatar	20600	6015	6015	1	-	-	-
-Saudi Arabia	10530	116,883	109,380	3	60	7	38
-Somalia	260	1352	1364	50	11	6	39
-Sudan	360	7668	6730	33	16	-	51
-Syria	1620	16,362	15,930	20	24	-	57
-Tunisia	1270	8890	6940	15	35	14	50
-UA Emirates	21920	28,496	28,840	1	67	9	32
-	550	4290	2940	24	21	9	56
-Yemen Dem.	550	1100	983	9	-	-	-
Totals	2253	416280	393063				

Sources:a-World Development Report 1986,The World Bank.

b-Yearbook of Agricultural Statistics, Vol.5 (1985). AOAD. Khartoum-Sudan,.

Annex(6)- Average annual growth rate of GDP, agriculture, industry and service in Arab countries for the periods of 1965-73 and 1973-84.

Country	Average annual growth rate (%)							
	GDP		Agriculture		Industry		Services	
	1965-73	1973-84	1965-73	1973-84	1965-73	1973-84	1965-73	1973-84
-Algeria	7.0	6.4	2.4	4.2	9.1	6.3	5.3	7.0
-Egypt	3.8	8.5	2.6	2.5	3.8	10.3	4.7	10.6
-Iraq	4.4	-	1.7	-	4.8	-	5.1	-
-Jordan (East Bank only)	-	9.6	-	5.4	-	13.6	-	8.5
-Kuwait	5.1	1.5	-	10.2	-	-4.5	-	8.1
-Lebanon	6.2	-	1.4	-	5.5	-	7.1	-
-Libya	7.7	3.0	11.5	6.5	6.6	-4.3	13.4	14.7
-Mauritania	2.6	2.3	-2.1	2.3	4.3	0.9	7.6	3.1
-Morocco	5.7	4.5	4.8	0.6	5.4	3.7	6.1	5.8
-Oman	21.9	6.1	-	-	-	-	-	-
-Saudi Arabia	11.2	6.0	2.6	6.9	13.3	2.4	8.3	12.5
-Sudan	0.2	5.5	0.3	2.7	1.0	6.4	0.5	7.5
-Syria	6.2	7.0	-0.7	6.8	14.9	4.5	5.7	8.3
-Tunisia	6.9	5.5	6.6	1.9	8.6	6.8	6.0	5.9
-Yemen AR.	-	8.1	-	1.8	-	13.8	-	9.6

Source:World Development Report, 1986-The World Bank.

Annex(7.1)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Cereals (total)

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	3102	2756	NA	1895	NA	688
-Bahrain	-	-	=	-	=	-
-Djibouti-	-	-	=	-	=	-
-Egypt	2016	2000	=	8414	=	4208
-Iraq	1872	2207	=	1703	=	772
-Jordan	171	137	=	101	=	733
-Kuwait	-	(··)	=	(··)	=	3091
-Lebanon	65	24	=	32	=	1364
-Libya	584	545	=	277	=	508
-Mauritania	110	152	=	54	=	353
-Morocco	4633	4459	=	3766	=	845
-Oman	-	2	=	3	=	1556
-Qatar	-	(··)	=	(··)	=	3300
-Saudi Arabia	279	282	=	616	=	1614
-Somalia	438	666	=	354	=	532
-Sudan	4211	4676	=	2700	=	577
-Syria	2700	2689	=	2763	=	1028
-Tunisia	1567	1432	=	1181	=	825
-UA Emirates	-	1	=	4	=	5651
-Yemen AR	1193	812	=	682	=	840
-Yemen Dem.	65	39	=	47	=	1187
-Total Arab Countries	23006	22979	=	24593	=	-
-World		726755	=	1673072	=	2301
-USA		71252	=	291867	=	4096
-USSR		117455	=	171708	=	1462
-Japan		2672	=	14221	=	5322
-Turkey		13385	=	25454	=	1902
-Mexico		10528	=	23147	=	2199
-Western Europe		45404	=	181921	=	4007

Notes:a-(··) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.2)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop:Wheat

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	2156	1674	1314	1080	600	645
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	570	566	1906	1914	3370	3382
-Iraq	1200	1148	941	797	970	694
-Jordan	128	93	59	76	460	823
-Kuwait	-	-	-	-	-	-
-Lebanon	49	17	54	24	1120	1458
-Libya	240	230	92	161	390	703
-Mauritania	-	(..)	-	(..)	-	778
-Morocco	1830	1776	1719	1769	940	996
-Oman	(..)	(..)	3	1	1640	2903
-Qatar	-	(..)	-	(..)	-	2880
-Saudi Arabia	72	192	131	523	1850	2732
-Somalia	4	4	4	1	343	339
-Sudan	283	150	312	179	1110	1192
-Syria	1590	1263	1552	1706	980	1351
-Tunisia	1135	880	792	815	700	927
-UA Emirates	-	(..)	-	(..)	-	1693
-Yemen AR	53	60	49	57	1200	948
-Yemen Dem.	14	7	23	9	680	1283
-Total Arab Countries	9324	8061	8948	9116	960	1131
-World		235717		480282	17200	2037
-USA		28996		70507	2070	2432
-USSR		55974		83936	1520	1500
-Japan		221		670	2800	3033
-Turkey		9096		16954	1730	1864
-Mexico		912		3592	3550	3939
-Western Europe		18300		75269	3290	4113

Notes:a-(..) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.2)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop:Wheat

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	2156	1674	1314	1080	600	645
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	570	566	1906	1914	3370	3382
-Iraq	1200	1148	941	797	970	694
-Jordan	128	93	59	76	460	823
-Kuwait	-	-	-	-	-	-
-Lebanon	49	17	54	24	1120	1458
-Libya	240	230	92	161	390	703
-Mauritania	-	(..)	-	(..)	-	778
-Morocco	1830	1776	1719	1769	940	996
-Oman	(..)	(..)	3	1	1640	2903
-Qatar	-	(..)	-	(..)	-	2880
-Saudi Arabia	72	192	131	523	1850	2732
-Somalia	4	4	4	1	343	339
-Sudan	283	150	312	179	1110	1192
-Syria	1590	1263	1552	1706	980	1351
-Tunisia	1135	880	792	815	700	927
-UA Emirates	-	(..)	-	(..)	-	1693
-Yemen AR	53	60	49	57	1200	948
-Yemen Dem.	14	7	23	9	680	1283
-Total Arab Countries	9324	8061	8948	9116	960	1131
-World		235717		480282	17200	2037
-USA		28996		70507	2070	2432
-USSR		55974		83936	1520	1500
-Japan		221		670	2800	3033
-Turkey		9096		16954	1730	1864
-Mexico		912		3592	3550	3939
-Western Europe		18300		75269	3290	4113

Notes:a-(..) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.3)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Maize

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	3	2	5	2	1790	846
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	777	800	2938	3399	3780	4247
-Iraq	23	23	85	36	3690	1549
-Jordan	(0.6)	(0.4)	1	1	1670	4192
-Kuwait	-	-	-	-	-	-
-Lebanon	1	-	2	-	2000	-
-Libya	2	1	2	1	1000	1000
-Mauritania	8	8	5	4	630	505
-Morocco	438	398	390	232	890	583
-Oman	-	-	-	-	-	-
-Qatar	-	-	-	-	-	-
-Saudi Arabia	4	3	4	2	930	597
-Somalia	145	157	100	151	690	963
-Sudan	86	63	50	36	580	572
-Syria	23	21	66	41	2830	1929
-Tunisia	-	-	-	-	-	-
-UA Emirates	-	(··)	-	2	-	25065
-Yemen AR	59	34	54	48	930	1443
-Yemen Dem.	6	3	15	6	2590	1678
-Total Arab Countries	1575	1514	3717	3961	2361	2616
-World		126830		418378	2930	3299
-USA		27822		177363	5740	6375
-USSR		3699		11091	3160	2998
-Japan		1		3	2700	2700
-Turkey		569		1356	2070	2385
-Mexico		7419		12858	1250	1733
-Western Europe		6271		33988	4030	5420

Notes:a-(··) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.4)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop:Barley

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	832	850	457	567	550	668
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	44	49	124	127	2820	2567
-Iraq	582	978	520	729	890	746
-Jordan	41	43	13	22	320	500
-Kuwait	-	(··)	-	(··)	-	3000
-Lebanon	10	5	8	6	800	1111
-Libya	346	314	177	113	510	360
-Mauritania	-	-	-	-	-	-
-Morocco	2186	2140	2031	1643	930	768
-Oman	-	-	-	-	-	-
-Qatar	-	(··)	-	1	-	3940
-Saudi Arabia	10	5	15	6	1500	1336
-Somalia	-	-	-	-	-	-
-Sudan	-	-	-	-	-	-
-Syria	1059	1389	674	1000	640	720
-Tunisia	413	517	219	304	530	588
-UA Emirates	-	(··)	-	1	-	17167
-Yemen AR	65	50	65	47	1000	945
-Yemen Dem.	1	(··)	2	(··)	2000	1000
-Total Arab Countries	5589	6340	4305	4566	770	720
-World		79100		163290	1920	2064
-USA		3751		10719	2070	2858
-USSR		31035		44190	1530	1424
-Japan		122		386	2800	3176
-Turkey		3010		5905	NA	1962
-Mexico		302		551	1730	1828
-Western Europe		15062		54770	3290	3636

Notes:a-(··) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.5)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Rice

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	1	-	2	-	2000	-
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	441	417	2451	2347	5600	5623
-Iraq	50	57	149	140	2980	2480
-Jordan	-	-	-	-	-	-
-Kuwait	-	-	-	-	-	-
-Lebanon	-	-	-	-	-	-
-Libya	-	-	-	-	-	-
-Mauritanis	2	4	8	13	4000	3485
-Morocco	7	3	23	13	3290	4159
-Oman	-	-	-	-	-	-
-Qatar	-	-	-	-	-	-
-Saudi Arabia	-	-	-	-	-	-
-Somalia	2	5	6	12	3000	2470
-Sudan	8	8	9	7	3000	891
-Syria	1	-	3	-	3000	-
-Tunisia	-	-	-	-	-	-
-UA Emirates	-	-	-	-	-	-
-Yemen AR	-	-	-	-	-	-
-Yemen Dem.	-	-	-	-	-	-
-Total Arab Countries	512	494	2651	2532	5178	5132
-World		144523		430949	2530	2982
-USA		1240		6525	5080	5263
-USSR		657		2558	3870	3891
-Japan		2300		13131	6020	5709
-Turkey		67		302	4550	4491
-Mexico		161		532	2940	3307
-Western Europe		301		1656		5497

Notes:a-(··) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.6)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Legumes (total)

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	96	116	70	43	730	371
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	167	153	354	308	2120	2015
-Iraq	59	44	47	35	810	797
-Jordan	26	13	11	10	420	759
-Kuwait	-	-	-	-	-	-
-Lebanon	21	10	19	10	890	1025
-Libya	8	9	8	10	1030	1118
-Mauritania	53	33	19	9	360	281
-Morocco	510	349	345	201	680	577
-Oman	-	-	-	-	-	-
-Qatar	-	-	-	-	-	-
-Saudi Arabia	3	-	5	-	1670	-
-Somalia	13	-	5	-	380	-
-Sudan	73	22	78	36	1060	1637
-Syria	282	225	213	198	750	883
-Tunisia	146	141	82	90	560	635
-UA Emirates	-	-	-	-	-	-
-Yemen AR	76	72	76	70	1010	967
-Yemen Dem.	-	-	-	-	-	-
-Total Arab Countries	1533	1186	1332	1020	870	860
-World					770	
-USA					1350	
-USSR					1390	
-Japan					1370	
-Turkey					1170	
-Mexico					600	
-Western Europe					720	

Notes:a-(··) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex (7.7)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Broad beans,dry

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	36	48	33	24	920	500
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	102	116	230	250	2250	2160
-Iraq	26	7	25	10	960	1341
-Jordan	1	(··)	1	(··)	1000	1000
-Kuwait	-	-	-	-	-	-
-Lebanon	1	-	1	-	1000	-
-Libya	6	8	6	8	1000	1000
-Mauritania	-	-	-	-	-	-
-Morocco	205	154	175	101	850	659
-Oman	-	-	-	-	-	-
-Qatar	-	-	-	-	-	-
-Saudi Arabia	-	-	-	-	-	-
-Somalia	-	-	-	-	-	-
-Sudan	16	18	20	30	1250	1641
-Syria	8	8	12	14	1500	1794
-Tunisia	62	63	45	47	730	752
-UA Emirates	-	-	-	-	-	-
-Yemen AR	-	-	-	-	-	-
-Yemen Dem.	-	-	-	-	-	-
-Total Arab Countries	463	422	548	484	1159	1148
-World	8977	3446	10030	4196	1117	1217
-USA						
-USSR						
-Japan						
-Turkey	30	31	50	65	1666	2110
-Mexico	52	37	42	53	808	1414
-Western Europe						

Notes:a-(··) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.8)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Chickpeas

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	34	41	26	27	760	663
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	5	8	7	13	1400	1584
-Iraq	14	18	8	12	570	673
-Jordan	2	3	1	2	500	753
-Kuwait	-	-	-	-	-	-
-Lebanon	3	2	3	3	1000	1364
-Libya	1	1	1	1	1120	676
-Mauritania	-	-	-	-	-	-
-Morocco	77	55	40	37	520	683
-Oman	-	-	-	-	-	-
-Qatar	-	-	-	-	-	-
-Saudi Arabia	-	-	-	-	-	-
-Somalia	-	-	-	-	-	-
-Sudan	3	1	3	1	1000	1103
-Syria	51	77	33	57	650	735
-Tunisia	36	66	21	35	580	527
-UA Emirates	-	-	-	-	-	-
-Yemen AR	-	-	-	-	-	-
-Yemen Dem.	-	-	-	-	-	-
-Total Arab Countries	226	272	143	188	633	691
-World		9664		6060	650	627
-USA						
-USSR						
-Japan						
-Turkey		273		283	1210	1037
-Mexico		183		202	1150	1102
-Western Europe						

Notes:a-(··) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.9)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Lentils

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	16	13	7	4	440	235
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	23	6	29	7	1260	1167
-Iraq	6	6	6	5	1000	826
-Jordan	18	11	7	8	390	761
-Kuwait	-	-	-	-	-	-
-Lebanon	4	4	3	3	750	750
-Libya	-	-	-	-	-	-
-Mauritania	-	-	-	-	-	-
-Morocco	46	51	26	21	570	406
-Oman	-	-	-	-	-	-
-Qatar	-	-	-	-	-	-
-Saudi Arabia	-	-	-	-	-	-
-Somalia	-	-	-	-	-	-
-Sudan	-	-	-	-	-	-
-Syria	140	71	103	59	740	820
-Tunisia	3	2	2	1	670	677
-UA Emirates	-	-	-	-	-	-
-Yemen AR	-	-	-	-	-	-
-Yemen Dem.	-	-	-	-	-	-
-Total Arab Countries	256	164	183	108	715	645
-World		2160		1414	630	655
-USA					1120	
-USSR						
-Japan						
-Turkey		468		449	1070	960
-Mexico		13		11	980	851
-Western Europe						

Notes:a-(..) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.10)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Dry onions

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	13	15	94	122	7231	8305
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	22	12	628	601	28546	51242
-Iraq	15	15	96	115	6400	7917
-Jordan	-	1	-	8	-	11367
-Kuwait	-	(..)	-	2	-	10269
-Lebanon	2	2	33	25	16500	14111
-Libya	9	6	53	73	5889	12939
-Mauritania	-	-	-	-	-	-
-Morocco	8	14	79	187	9875	13216
-Oman	1	(0.4)	8	5	8000	-
-Qatar	-	-	-	-	-	-
-Saudi Arabia	3	3	59	35	19667	15274
-Somalia	-	-	-	-	-	-
-Sudan	3	6	20	56	6667	9772
-Syria	10	9	140	170	14141	18139
-Tunisia	2	2	22	24	11000	9992
-UA Emirates	-	( )	-	5	-	19037
-Yemen AR	-	-	-	-	-	-
-Yemen Dem.	-	(0.5)	-	4	-	8644
-Total Arab Countries	88	84	1232	1430	14016	17050
-World		1647		21998	11530	13355
-USA		48		1724	34500	35921
-USSR		178		1995	8610	11233
-Japan		28.8		1155	36190	40104
-Turkey		72		1035	11910	14335
-Mexico		-		-	8020	-
-Western Europe		142		3103	15710	21851

Notes:a-(..) means negligble value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.11)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Tomatoes

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	15	30	173	284	9450	9675
-Bahrain	(··)	(··)	7	5	-	22327
-Djibouti-	-	-	-	-	-	-
-Egypt	138	138	1911	2608	14640	18919
-Iraq	36	37	389	416	9060	11174
-Jordan	9	12	145	195	13000	16332
-Kuwait	-	1	-	15	-	21918
-Lebanon	5	6	68	124	13200	21448
-Libya	17	14	220	199	11710	14582
-Mauritania	-	-	-	-	-	-
-Morocco	14	15	426	377	34430	26019
-Oman	-	1	-	38	-	30038
-Qatar	-	(··)	-	5	-	18708
-Saudi Arabia	21	18	264	267	12570	15154
-Somalia	-	-	-	-	-	-
-Sudan	12	10	140	130	11920	13309
-Syria	33	38	477	746	15180	19776
-Tunisia	17	19	273	342	15290	18487
-UA Emirates	1	1	14	49	14000	40028
-Yemen AR	-	-	-	-	-	-
-Yemen Dem.	-	1	-	15	-	11856
-Total Arab Countries	318	341	4507	5815	14173	17161
-World		2462		54359	20200	22079
-USA		164		7358	405100	44811
-USSR		400		7084	16230	17728
-Japan					51510	
-Turkey		115		3710	32810	32317
-Mexico		71		1465	17730	20698
-Western Europe					27120	

Notes:a-(··) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.12) -Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Potatoes

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	71	77	515	525	7254	6845
-Bahrain	-	-	-	-	-	-
-Djibouti-	-	-	-	-	-	-
-Egypt	55	69	894	1178	16404	17615
-Iraq	6	5	48	99	8276	19638
-Jordan	1	1	11	10	11000	14994
-Kuwait	-	-	-	-	-	-
-Lebanon	9	8	87	131	9355	16024
-Libya	10	9	85	109	8500	12298
-Mauritania	-	-	-	-	-	-
-Morocco	18	33	184	448	10514	13489
-Oman	-	-	-	-	-	-
-Qatar	-	-	-	-	-	-
-Saudi Arabia	-	(..)	-	4	-	10156
-Somalia	-	-	-	-	-	-
-Sudan	1	1	25	18	25000	15481
-Syria	12	19	145	295	12609	15228
-Tunisia	5	10	99	132	19800	
-UA Emirates	-	(..)	-	2	-	11857
-Yemen AR	9	12	94	148	11059	12434
-Yemen Dem.	-	1	-	9	-	11024
-Total Arab Countries	195	243	2187	3109	11210	12772
-World		19384		274986	14170	14186
-USA		503		15351	29130	30543
-USSR		6872		77114	11810	11221
-Japan		127		3488	24010	27510
-Turkey		184		3050	15110	16612
-Mexico		70		875	1290	12503
-Western Europe		2077		47428	18570	22833

Notes:a- (..) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(7.13)-Average area, production and productivity of major crops in Arab countries, world and some other countries, for the periods of 1975-78 and 1980-84.

Crop: Water melons

Country	Area (1000 ha)		Production (100 mt)		Productivity (kg/ha)	
	1975-78	1980-84	1975-78	1980-84	1975-78	1980-84
-Algeria	25	31	183	195	7320	6373
-Bahrain	-	(··)	-	1	-	64935
-Djibouti-	-	-	-	-	-	-
-Egypt	50	52	1277	1198	25540	23038
-Iraq	41	49	500	614	12195	12582
-Jordan	4	5	26	41	6500	8625
-Kuwait	-	-	-	-	-	-
-Lebanon	3	2	30	31	10000	15500
-Libya	14	15	138	185	9857	12644
-Mauritania	1	1	3	5	3000	5000
-Morocco	7	8	129	138	18429	17200
-Oman	-	(··)	-	3	-	9211
-Qatar	-	(··)	-	2	-	10753
-Saudi Arabia	13	19	257	404	19769	20825
-Somalia	-	-	-	-	-	-
-Sudan	3	3	84	94	28000	31400
-Syria	82	100	636	854	7756	8561
-Tunisia	13	13	160	211	12308	16746
-UA Emirates	-	1	-	26	-	26000
-Yemen AR	1	-	52	-	52000	-
-Yemen Dem.	-	2	-	60	-	37375
-Total Arab Countries	257	300	3475	4061	13521	13551
-World		1858		25933	12260	13954
-USA		81		1156	12670	14338
-USSR		449		3780	5850	8415
-Japan		30		920	32540	30680
-Turkey		236		4532	19190	19203
-Mexico		32		4692	13140	14481
-Western Europe		115		2523	18080	21863

Notes:a-(··) means negligible value i.e less than 1

b-NA means not available

Sources:See page 151

Annex(8.1)-Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Cereals Unit: 1000 metric tons

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR(%)
-Algeria	1894.8	-	3742.1	3742.1	5636.9	33.6
-Bahrain	-	(..)	56.5	56.4	56.4	0.0
-Djibout	-	-	40.3	40.3	40.3	0.0
-Egypt	8414.3	59.6	6420.2	6360.5	14774.8	57.0
-Iraq	1703.3	-	2614.0	2614.0	4317.4	39.5
-Jordan	100.7	21.2	639.5	618.3	719.0	14.0
-Kuwait	0.3	67.6	488.1	420.5	426.9	0.1
-Lebanon	32.2	36.8	562.4	525.6	557.8	5.8
-Libya	277.3	-	846.3	846.3	1123.6	24.7
-Mauritania	53.6	-	200.2	200.2	253.8	21.1
-Morocco	3765.8	14.1	2129.7	2115.6	5881.4	64.0
-Oman	2.8	17.4	173.9	156.5	159.3	1.8
-Qatar	00.9	-	89.8	89.8	90.7	1.0
-Saudi Arabia	617.6	14.6	5004.5	4989.9	5607.5	11.0
-Somalia	354.4	(..)	220.5	220.5	574.9	61.7
-Sudan	2699.5	239.1	370.6	131.5	2831.0	95.4
-Syria	2762.7	150.6	1047.9	897. 3	3660.0	75.5
-Tunisia	1181.0	1.6	1000.7	999.1	2180.1	54.2
-UA Emirates	3.6	60.3	337.3	277.0	280.6	1.3
-Yemen AR	681.6	(..)	514.7	514.7	1196.2	57.0
-Yemen Dem.	46.8	0.4	207.1	206.7	253.5	18.5
Totals	24593.1	683.4	26706.1	26022.7	50615.8	48.6

Notes: a-For figures in "Balance", no sign indicates a negative value, plus sign indicates a positive value.
b-(..) means a negligible value i.e. less than 0.1
c-NA means negative value

Sources: See page 151

Annex(8.2)-Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Wheat Unit:1000 metric tons

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR(%)
-Algeria	1079.8	-	2982.2	2982.2	4062.0	26.6
-Bahrain	-	(..)	13.9	13.9	13.9	0.0
-Djibout	-	-	15.7	15.7	15.7	0.0
-Egypt	1914.5	-	5110.1	5110.1	7024.6	27.3
-Iraq	796.8	-	1885.0	1885.0	2681.8	29.7
-Jordan	76.4	16.0	396.0	380.0	456.4	16.8
-Kuwait	-	60.2	219.7	159.5	159.5	0.0
-Lebanon	24.2	1.4	341.6	340.2	364.4	6.6
-Libya	161.3	-	603.1	603.1	764.4	21.1
-Mauritania	0.4	-	110.1	110.1	110.5	0.3
-Morocco	1769.2	-	1906.8	1906.8	3675.9	48.1
-Oman	1.0	12.1	84.4	72.3	73.3	1.4
-Qatar	0.1	-	41.5	41.5	41.6	0.4
-Saudi Arabia	523.4	11.3	661.6	650.3	1173.7	44.6
-Somalia	-	-	85.8	85.8	85.8	0.0
-Sudan	179.2	-	347.4	347.4	526.6	34.0
-Syria	1706.4	2.0	644.4	642.4	2348.8	72.7
-Tunisia	815.4	1.3	615.8	614.5	1429.9	57.0
-UA Emirates	0.9	8.2	144.0	135.8	136.7	0.6
-Yemen AR	57.2	(..)	475.6	475.6	532.8	10.7
-Yemen Dem.	9.1	0.1	161.6	161.5	170.6	5.3
Totals	9115.4	112.6	16846.0	16733.4	25848.8	36.3

Notes:a-For figures in "Balance", no sign indicates a negative value, plus sign indicates a positive value.

b-(..) means a negligible value i.e. less than 0.1

c-NA means negative value

Sources:See page151

Annex(8.3)Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Maize Unit:1000 metric tc

Country	Production	Exports	Imports	Balance	Total Regs.	SSR (%
-Algeria	1.8	-	329.2	329.2	331.0	0.5
-Bahrain	-	(..)	10.1	10.1	10.1	0.0
-Djibout	-	-	-	-	-	-
-Egypt	3399.0	-	1301.9	1301.9	4700.9	72.3
-Iraq	36.1	-	147.1	147.1	183.2	19.7
-Jordan	0.4	1.5	139.6	138.1	138.6	0.3
-Kuwait	-	(..)	61.5	61.5	61.5	0.0
-Lebanon	-	34.0	174.9	140.9	140.9	0.0
-Libya	1.0	-	60.3	60.3	61.3	1.6
-Mauritania	4.0	-	-	-	4.0	100.0
-Morocco	232.3	-	85.6	85.6	317.9	73.1
-Oman	-	1.5	5.2	3.7	3.7	0.0
-Qatar	-	-	0.6	0.6	0.6	0.0
-Saudi Arabia	1.8	(..)	756.8	756.8	758.5	0.2
-Somalia	151.4	-	60.2	60.2	211.6	71.6
-Sudan	35.8	-	-	-	35.8	100.0
-Syria	41.1	(..)	189.9	189.9	231.0	17.8
-Tunisia	-	-	249.1	249.1	249.1	0.0
-UA Emirates	1.6	0.1	22.0	21.9	23.5	6.6
-Yemen AR	48.4	(..)	4.6	4.6	53.0	91.3
-Yemen Dem.	5.8	-	4.0	4.0	9.8	59.3
Totals	3960.5	37.1	3602.6	3565.5	7526.0	52.6

Notes:a-For figures in "Balance", no sign indicates a negative value, plus sign indicates a positive value.

b-(..) means a negligible value i.e. less than 0.1

c-NA means negative value

Source:See page 151

Annex(8.4) Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Barley Unit:1000 metric to

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%
-Algeria	567.4	-	394.2	394.2	961.6	59.0
-Bahrain	-	-	1.6	1.6	1.6	0.0
-Djibout	-	-	-	-	-	-
-Egypt	126.6	-	8.00	8.00	134.6	94.1
-Iraq	728.9	-	228.6	228.6	957.5	76.1
-Jordan	21.6	3.2	59.4	56.1	77.8	27.8
-Kuwait	0.3	0.7	121.5	120.8	121.1	0.2
-Lebanon	6.0	1.0	21.9	20.9	26.9	22.3
-Libya	112.8	-	128.1	128.1	240.9	46.8
-Mauritania	-	-	0.2	0.2	0.2	0.0
-Morocco	1642.8	-	101.6	101.6	1744.4	94.2
-Oman	-	1.5	5.1	3.6	3.6	0.0
-Qatar	0.8	-	26.8	26.8	27.6	2.9
-Saudi Arabia	6.0	0.4	3119.9	3119.5	3125.5	0.2
-Somalia	-	-	1.6	1.6	1.6	0.0
-Sudan	-	-	-	-	-	-
-Syria	999.9	148.6	109.3	+39.3	960.6	104.1
-Tunisia	304.1	-	45.7	45.7	349.8	86.9
-UA Emirates	1.0	2.2	31.9	29.7	30.8	3.3
-Yemen AR	47.1	-	0.74	0.74	47.8	98.5
-Yemen Dem.	0.4	-	-	-	0.4	100.0
Totals	4565.7	157.5	4406.0	4248.5	8814.1	51.8

Notes:a-For figures in "Balance", no sign indicates a negative value, plus sign indicates a positive value.

b-(..) means a negligible value i.e. less than 0.1

c-NA means negative value

Sources:See page 151

Annex(8.5) Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Rice Unit:1000 metric ton

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	-	-	22.0	22.0	22.0	0.0
-Bahrain	-	(··)	27.8	27.8	27.8	0.0
-Djibout	-	-	22.0	22.0	22.0	0.0
-Egypt	2346.6	59.6	-	+59.6	2287.0	102.6
-Iraq	140.4	-	326.5	326.5	466.9	30.1
-Jordan	-	0.5	44.3	43.8	43.8	0.0
-Kuwait	-	6.5	84.7	78.2	78.2	0.0
-Lebanon	-	0.4	24.0	23.6	23.6	0.0
-Libya	-	-	53.1	53.1	53.1	0.0
-Mauritania	13.0	-	62.9	62.9	75.9	17.1
-Morocco	13.1	-	7.1	7.1	20.2	65.0
-Oman	-	1.8	68.6	66.9	66.9	0.0
-Qatar	-	-	19.1	19.1	19.1	0.0
-Saudi Arabia	-	2.2	446.9	444.7	444.7	0.0
-Somalia	12.4	(··)	67.2	67.2	67.6	15.6
-Sudan	6.7	-	22.9	22.9	29.6	22.7
-Syria	-	-	104.3	104.3	104.3	0.0
-Tunisia	-	-	3.2	3.2	3.2	0.0
-UA Emirates	-	48.5	138.4	89.9	89.9	0.0
-Yemen AR	-	(··)	32.3	32.3	32.3	0.0
-Yemen Dem.	-	0.3	41.5	41.2	41.2	0.0
Totals	2532.2	119.9	1618.7	1498.8	4031.0	62.8

Notes:a-For figures in "Balance", no sign indicates a negative value, plus sign indicates a positive value.

b-(··) means a negligible value i.e. less than 0.1

c-NA means negative value

Sources:See page151

Annex(8.6)-Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Legumes (total) Unit:1000 metric tons

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	40.0	-	105.5	105.5	145.5	27.5
-Bahrain	-	-	2.4	2.4	2.4	0.0
-Djibouti	-	-	-	-	-	-
-Egypt	317.2	3.14	97.4	94.3	411.4	77.1
-Iraq	34.0	-	33.5	33.5	67.5	50.4
-Jordan	10.2	1.8	13.8	12.0	22.2	46.0
-Kuwait	-	0.4	8.7	8.4	8.4	0.0
-Lebanon	10.0	10.3	50.3	40.0	50.0	20.0
-Libya	9.7	-	19.2	19.2	28.8	33.6
-Mauritania	12.0	-	-	-	12.0	100.0
-Morocco	191.2	5.8	-	+5.8	185.4	103.2
-Oman	-	-	1.2	1.2	1.2	0.0
-Qatar	-	-	1.9	1.9	1.9	0.0
-Saudi Arabia	-	0.5	31.2	30.8	30.8	0.0
-Somalia	-	-	0.2	0.2	0.2	0.0
-Sudan	34.0	1.5	12.6	11.0	45.0	75.6
-Syria	184.7	29.6	0.8	+28.9	155.8	118.5
-Tunisia	88.8	6.3	0.1	+6.2	82.6	107.5
-UA Emirates	-	2.9	11.9	9.0	9.0	0.0
-Yemen AR	64.8	-	0.9	0.9	65.7	98.9
-Yemen Dem.	-	-	1.5	1.5	1.5	0.0
Totals	996.6	62.3	393.1	330.9	1327.5	75.1

Notes:a-For figures in "Balance, no sign indicates a negative value, plus sign indicates a positive value.

b-(..) means a negligible value i.e. less than 0.1

c-NA means negative value

Sources:See page 151

Annex (8.7) Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Vegetables (total) Unit:1000 metric ton

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	960.9	-	14.6	14.6	975.6	98.5
-Bahrain	6.8	-	32.2	32.2	39.0	17.4
-Djibouti	NA	-	0.3	0.3	0.3	0.0
-Egypt	7597.3	193.3	48.0	+145.3	7452.0	102.0
-Iraq	2272.7	2.4	53.3	50.9	2323.6	97.8
-Jordan	447.5	337.8	28.6	+309.2	138.3	323.2
-Kuwait	42.2	3.1	196.5	193.4	235.6	17.9
-Lebanon	401.7	20.7	30.3	9.6	411.3	97.7
-Libya	663.2	-	1.8	1.8	665.0	99.7
-Mauritania	3.4	-	1.2	1.2	4.6	73.4
-Morocco	2062.8	63.3	0.4	+62.9	1999.9	103.15
-Oman	137.1	2.1	15.3	13.2	150.3	91.2
-Qatar	16.8	-	9.8	9.8	26.6	63.1
-Saudi Arabia	914.0	32.9	388.8	355.9	1269.9	72.0
-Somalia	73.4	(··)	0.7	0.7	74.1	99.1
-Sudan	775.6	0.2	(··)	+0.1	775.4	100.0
-Syria	3652.0	16.4	74.8	58.4	3710.4	98.4
-Tunisia	1087.3	1.5	5.8	4.3	1091.6	99.6
-UA Emirates	228.3	43.2	208.5	165.3	393.6	58.0
-Yemen AR	307.5	0.1	11.8	11.7	319.2	96.3
-Yemen Dem.	40.2	1.2	8.3	7.1	47.4	84.9
Totals	21690.6	718.2	1131.0	412.9	22103.6	98.1

Notes: a-For figures in "Balance, no sign indicates a negative value, plus sign indicates a positive value.

b-(··) means a negligible value i.e. less than 0.1

c-NA means not available.

Sources: See page 151

Annex(8.8) Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Dry onions Unit:1000 metric tons

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	121.5	-	-	-	121.5	100.0
-Bahrain	-	-	7.9	7.9	7.9	0.0
-Djibouti	-	(..)	0.2	0.2	0.2	0.0
-Egypt	600.6	26.6	-	+26.6	574.0	104.6
-Iraq	115.0	0.1	17.2	17.1	132.1	87.0
-Jordan	7.6	5.0	18.00	13.0	21.6	39.8
-Kuwait	1.9	0.1	25.5	25.4	27.3	7.0
-Lebanon	25.4	9.2	17.6	8.4	33.8	75.2
-Libya	72.7	-	0.6	0.6	73.3	99.2
-Mauritania	-	-	1.10	1.10	1.10	0.0
-Morocco	186.9	2.2	(..)	+2.2	184.7	101.2
-Oman	5.1	-	-	-	5.1	100.0
-Qatar	-	-	4.6	4.6	4.6	0.0
-Saudi Arabia	34.5	2.3	104.7	102.5	137.0	25.2
-Somalia	-	-	(..)	(..)	(..)	0.0
-Sudan	55.8	0.1	(..)	+0.1	55.8	100.1
-Syria	169.5	6.0	1.2	+4.8	164.7	102.9
-Tunisia	24.0	0.5	-	+0.5	23.5	101.9
-UA Emirates	5.1	15.4	62.3	46.9	52.1	9.9
-Yemen AR	-	-	0.04	0.04	0.04	0.0
-Yemen Dem.	3.9	(..)	2.0	1.9	5.8	66.8
Totals	1430.5	67.2	264.9	195.7	1626.2	88.0

Notes: a-For figures in "Balance, no sign indicates a negative value, plus sign indicates a positive value.
b-(..) means a negligible value i.e. less than 0.1
c-NA means not available

Sources: See page 151

Annex(8.9) Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Tomatoes Unit:1000 metric tons

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	284.4	-	-	-	284.4	100.0
-Bahrain	4.6	(··)	2.9	2.9	7.5	61.8
-Djibout	-	-	0.1	0.1	0.1	0.0
-Egypt	2608.2	8.1	-	+8.1	2600.1	100.3
-Iraq	415.9	2.8	21.0	18.2	434.1	95.8
-Jordan	195.0	129.9	3.1	+126.8	68.2	285.8
-Kuwait	14.9	0.7	33.9	33.1	48.0	31.0
-Lebanon	124.4	11.2	10.9	+0.3	124.1	100.2
-Libya	199.2	-	(··)	(··)	199.2	100.0
-Mauritania	-	-	0.1	0.1	0.1	0.0
-Morocco	376.8	71.6	-	+71.6	305.2	123.5
-Oman	38.3	0.9	0.7	+0.2	38.2	100.4
-Qatar	4.9	-	0.2	0.2	5.1	96.2
-Saudi Arabia	267.3	3.1	104.4	101.3	368.3	72.5
-Somalia	-	-	(··)	(··)	(··)	0.0
-Sudan	129.6	-	-	-	129.6	100.0
-Syria	745.5	1.0	46.4	45.4	791.0	94.3
-Tunisia	342.0	0.4	-	+0.4	341.6	100.1
-UA Emirates	48.6	1.4	16.1	14.7	63.4	76.7
-Yemen AR	-	-	(··)	(··)	(··)	0.0
-Yemen Dem.	14.5	(··)	-	+(-)	14.5	100.1
Totals	5814.0	231.1	239.9	8.8	5822.8	99.9

Notes:a-For figures in "Balance", no sign indicates a negative value, plus sign indicates a positive value.

b-(··) means a negligible value i.e. less than 0.1

c-NA means negative value

Sources:See page 151

Annex(8.10)Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Potatoes Unit:1000 metric tor

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	525.0	-	228.7	228.7	753.7	69.7
-Bahrain	0.1	-	8.6	8.6	8.7	0.6
-Djibout	-	-	2.0	2.0	2.0	0.0
-Egypt	1177.6	133.5	29.1	+104.4	1073.2	109.7
-Iraq	98.7	-	27.2	27.2	125.9	78.4
-Jordan	9.5	2.9	34.2	31.3	40.8	23.3
-Kuwait	0.3	0.1	28.5	28.4	28.7	0.9
-Lebanon	131.4	98.6	110.0	11.4	142.8	92.0
-Libya	108.5	-	4.2	4.2	112.7	96.3
-Mauritania	0.9	-	2.7	2.7	3.5	24.3
-Morocco	448.4	37.1	24.7	+12.4	436.0	102.9
-Oman	-	( )	2.5	2.5	2.5	0.0
-Qatar	0.1	-	3.3	3.3	3.4	2.8
-Saudi Arabia	4.3	1.4	91.0	89.6	93.9	0.5
-Somalia	-	-	0.3	0.3	0.3	0.0
-Sudan	18.2	-	0.6	0.6	18.8	96.7
-Syria	295.4	6.3	9.2	2.9	298.3	99.0
-Tunisia	132.0	3.5	21.7	18.2	150.2	87.9
-UA Emirates	1.7	3.3	25.6	22.4	24.0	0.7
-Yemen AR	148.4	0.2	(··)	+0.2	148.3	100.1
-Yemen Dem.	9.2	-	3.3	3.3	12.5	73.9
Totals	3109.5	287.0	657.6	370.6	3480.1	89.4

Notes:a-For figures in "Balance", no sign indicates a negative value, plus sign indicates a positive value.

b-(··) means a negligible value i.e. less than 0.1

c-NA means negative value

Sources:See page151

Annex(8.11) Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Fruits (total) Unit:1000 metric tons

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	765.3	11.3	30.7	19.4	784.7	97.5
-Bahrain	12.1	-	26.2	26.2	38.3	31.6
-Djibout	NA	-	0.5	0.5	0.5	0.0
-Egypt	2740.5	140.2	34.6	+105.7	2634.9	104.0
-Iraq	1113.3	112.9	83.4	+29.5	1083.9	102.7
-Jordan	83.0	141.3	126.2	+14.4	68.7	120.9
-Kuwait	2.5	18.1	148.7	130.6	133.1	1.9
-Lebanon	714.3	280.4	1.8	+277.6	435.8	163.9
-Libya	285.4	-	27.7	27.7	313.1	91.2
-Mauritania	12.7	-	0.6	0.6	13.3	95.2
-Morocco	1679.2	595.5	2.0	+593.5	1085.8	154.7
-Oman	111.7	3.3	31.5	28.1	139.8	79.9
-Qatar	8.4	-	18.2	18.2	26.6	31.7
-Saudi Arabia	460.9	37.4	661.3	624.0	1084.9	42.5
-Somalia	89.1	28.3	0.9	+27.4	61.7	144.5
-Sudan	763.0	3.6	1.8	+1.9	761.2	100.2
-Syria	944.3	5.2	121.3	116.1	1060.4	89.1
-Tunisia	529.5	38.6	22.5	+16.1	513.4	103.1
-UA Emirates	65.2	48.1	259.0	210.9	276.1	23.9
-Yemen AR	158.4	0.1	88.0	87.9	246.3	64.3
-Yemen Dem.	23.8	1.1	14.2	13.2	37.0	64.4
Totals	10562.8	1465.3	1701.0	235.7	10798.5	97.8

Notes:a-For figures in "Balance, no sign indicates a negative value, plus sign indicates a positive value.

b-(..) means a negligible value i.e. less than 0.1

c-NA means not available.

Sources:See page 151

Annex(8.12) verage production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Apples Unit:1000 metric ton

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	24.6	-	-	-	24.6	100.0
-Bahrain	-	-	2.6	2.6	2.6	0.0
-Djibout	-	-	-	-	-	-
-Egypt	22.8	(··)	14.3	14.3	37.1	61.5
-Iraq	101.8	-	68.1	68.1	169.9	59.9
-Jordan	0.1	0.6	33.8	33.2	33.7	1.3
-Kuwait	-	0.8	24.0	23.2	23.2	0.0
-Lebanon	111.2	80.4	-	+80.4	30.8	360.7
-Libya	6.6	-	12.4	12.4	19.0	34.7
-Mauritania	-	-	0.2	0.2	0.2	0.0
-Morocco	95.2	(··)	0.4	0.4	95.6	99.6
-Oman	-	-	5.5	5.5	5.5	0.0
-Qatar	-	-	1.1	1.1	1.1	0.0
-Saudi Arabia	-	2.4	107.5	105.1	105.1	0.0
-Somalia	-	-	-	-	-	-
-Sudan	-	-	0.7	0.7	0.7	0.0
-Syria	115.1	2.3	16.2	13.8	128.9	89.3
-Tunisia	17.8	-	8.7	8.7	26.6	67.2
-UA Emirates	-	9.4	28.4	18.9	18.9	0.0
-Yemen AR	-	-	23.7	23.7	23.7	0.0
-Yemen Dem.	-	(··)	3.0	3.0	3.0	0.0
Totals	495.6	95.9	350.4	254.6	750.2	66.1

Notes:a-For figures in "Balance", no sign indicates a negative value, plus sign indicates a positive value.

b-(··) means a negligible value i.e. less than 0.1

c-NA means negative value

Sources:See page 151

Annex(8.13)Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Red meat Unit:1000 metric tons

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	143.8	-	27.7	27.7	171.4	83.9
-Bahrain	3.1	-	7.7	7.7	10.8	28.6
-Djibout	5.0	-	0.3	0.3	5.3	93.6
-Egypt	329.5	(..)	112.8	112.7	442.3	74.5
-Iraq	99.5	-	58.5	58.5	157.9	63.0
-Jordan	7.6	-	20.5	20.5	28.2	26.9
-Kuwait	46.8	2.8	19.2	16.4	63.2	74.1
-Lebanon	23.4	-	21.6	21.6	45.0	52.0
-Libya	55.1	-	18.7	18.7	73.8	74.7
-Mauritania	40.4	-	(..)	(..)	40.4	100.0
-Morocco	189.9	2.0	4.2	2.3	192.1	98.8
-Oman	9.7	0.1	10.7	10.6	20.3	48.0
-Qatar	2.5	-	3.5	3.5	6.0	41.1
-Saudi Arabia	143.3	0.4	81.3	80.9	224.2	63.9
-Somalia	157.6	(..)	-	+(..)	157.6	100.0
-Sudan	414.3	-	-	-	414.3	100.0
-Syria	132.9	-	6.7	6.7	139.6	95.2
-Tunisia	59.4	(..)	10.6	10.6	70.0	84.9
-UA Emirates	13.8	3.6	43.6	40.0	53.7	25.6
-Yemen AR	37.2	(..)	1.1	1.0	38.2	97.3
-Yemen Dem.	10.4	-	1.0	1.0	11.4	91.1
Totals	1925.0	9.1	449.7	440.7	2365.7	81.4

Notes:a-For figures in "Balance, no sign indicates a negative value, plus sign indicates a positive value.

b-(..) means a negligible value i.e. less than 0.1

c-NA means negative value

Sources:See page 151

Annex(8.14)Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: White Meat (poultry meat) Unit:1000 metric tons

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	102.3	-	-	-	102.3	100.0
-Bahrain	3.7	(··)	6.2	6.2	9.9	36.9
-Djibouti	-	-	0.3	0.3	0.3	0.0
-Egypt	161.8	(··)	55.1	55.1	216.9	74.6
-Iraq	116.5	-	81.0	81.0	197.5	59.0
-Jordan	32.1	(··)	6.9	6.9	39.0	82.3
-Kuwait	17.2	16.7	46.8	30.1	47.4	36.4
-Lebanon	32.4	-	3.7	3.7	36.1	89.9
-Libya	36.3	-	-	-	36.3	100.0
-Mauritania	3.2	-	(··)	(··)	3.2	100.0
-Morocco	101.0	-	(··)	(··)	101.0	100.0
-Oman	0.9	0.2	16.5	16.4	17.3	5.3
-Qatar	0.9	-	10.0	10.0	11.0	8.6
-Saudi Arabia	102.8	0.2	193.5	193.4	296.2	34.7
-Somalia	3.2	-	-	-	3.2	100.0
-Sudan	25.3	-	-	-	25.3	100.0
-Syria	67.6	-	0.1	0.1	67.7	99.8
-Tunisia	42.1	(··)	0.1	0.1	42.2	99.8
-UA Emirates	3.4	2.8	40.5	37.7	41.1	8.3
-Yemen AR	14.7	(··)	35.5	35.4	50.1	29.4
-Yemen Dem.	1.2	(··)	5.4	5.4	6.5	17.9
Totals	868.2	19.9	501.7	481.9	1350.0	64.3

Notes:a-For figures in "Balance, no sign indicates a negative value, plus sign indicates a positive value.

b-(··) means a negligible value i.e. less than 0.1

c-NA means not available

Sources:See page151

Annex(8.15)Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Eggs in Shell (for human consumption) Unit:1000 metric to

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%
-Algeria	27.0	-	52.4	52.4	79.4	34.0
-Bahrain	3.1	-	1.4	1.4	4.5	68.1
-Djibout	-	-	0.3	0.3	0.3	0.0
-Egypt	117.9	(..)	8.6	8.6	126.5	93.2
-Iraq	45.1	-	26.8	26.8	71.9	62.7
-Jordan	20.0	2.9	-	+2.9	17.1	117.0
-Kuwait	9.6	0.1	11.2	11.1	20.8	46.4
-Lebanon	37.2	5.9	3.9	+2.0	35.2	105.7
-Libya	19.1	-	1.5	1.5	20.6	92.8
-Mauritania	2.9	-	-	-	2.9	100.0
-Morocco	44.6	-	0.1	0.1	44.7	99.9
-Oman	1.3	0.2	4.7	4.5	5.8	21.9
-Qatar	0.4	-	3.4	3.4	3.8	9.6
-Saudi Arabia	68.5	0.2	9.1	8.9	77.4	88.5
-Somalia	2.5	-	-	-	2.5	100.0
-Sudan	30.2	-	(..)	(..)	30.2	100.0
-Syria	82.2	0.1	0.1	(..)	82.2	100.0
-Tunisia	42.4	0.2	0.4	0.2	42.6	99.5
-UA Emirates	3.9	2.4	16.0	13.6	17.5	22.3
-Yemen AR	7.3	(..)	8.3	8.3	15.6	46.9
-Yemen Dem.	1.4	(..)	1.9	1.9	3.3	42.8
Totals	566.6	11.9	150.1	138.2	704.8	80.4

Notes:a-For figures in "Balance", no sign indicates a negative value, plus sign indicates a positive value.

b-(..) means a negligible value i.e. less than 0.1

c-NA means not available

Sources:See page 151

Annex(8.16)Average production, balance of export/import, total requirement and self-sufficiency ratio (SSR) of major food commodities in Arab countries for the period 1980-84.

Commodity: Sugar (refined) Unit:1000 metric tons

Country	Production	Exports	Imports	Balance	Total Reqs.	SSR (%)
-Algeria	-	-	473.3	473.3	473.3	0.0
-Bahrain	-	-	13.0	13.0	13.0	0.0
-Djibout	-	-	28.2	28.2	28.2	0.0
-Egypt	672.0	17.4	481.6	464.2	1136.2	59.2
-Iraq	26.0	-	312.2	312.2	338.2	7.7
-Jordan	-	(··)	82.9	82.9	82.9	0.0
-Kuwait	-	2.4	59.0	56.6	56.6	0.0
-Lebanon	8.4	-	78.8	78.8	87.2	9.6
-Libya	-	-	121.8	121.8	121.8	0.0
-Mauritania	-	-	32.3	32.3	32.3	0.0
-Morocco	398.0	23.1	175.2	152.1	550.1	72.4
-Oman	-	(··)	21.8	21.8	21.8	0.0
-Qatar	-	-	11.2	11.2	11.2	0.0
-Saudi Arabia	-	10.9	407.5	396.6	396.6	0.0
-Somalia	31.0	(··)	28.3	28.3	59.3	52.3
-Sudan	276.2	-	252.0	252.0	528.2	52.3
-Syria	142.4	-	274.9	274.9	417.3	34.1
-Tunisia	7.9	4.7	147.6	142.9	150.8	5.3
-UA Emirates	-	12.3	78.6	66.3	66.3	0.0
-Yemen AR	-	(··)	119.2	119.2	119.2	0.0
-Yemen Dem.	-	-	43.3	43.3	43.3	0.0
Totals	1561.9	70.9	3242.7	3171.8	4733.7	33.0

Notes:a-For figures in "Balance, no sign indicates a negative value, plus sign indicates a positive value.
b-(··) means a negligible value i.e. less than 0.1
c-NA means negative value

Sources:See page

Sources of Annex(7) and Annex(8):

a- Yearbook of Agricultural Statistics, Vol.4 and 5, (1984 & 1985), AOAD, Khartoum-Sudan.

b- FAO Production Yearbook, Vols.31, 32, 34, 36 & 38 (1977, 78, 80, 82 & 84 respectively). Food and Agriculture Organization of the United Nations, Rome-Italy.

c- FAO Trabe Yearbook, Vols.36 & 38 (1982 & 1984).Food and Agriculture Organization of the United Nations,Rome-Italy.

d- Qasem, 1982.

Annex(9.1) -Distribution of manpower working in agricultural research institution outside universities by field.

- Country:..Egypt... - Year/Notes: ..1984-85...
- Institutions(s):-Various Agricultural Research. Centers*.

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops	132	104		236	9.0
Fruits and vegetables	127	186		313	11.9
Others-Cotton	80	59		139	5.3
-Sugar Cane	16	15		31	1.2
-Total Plant Production	355	364		719	27.3%
Plant Diseases	130	84		214	8.1
Entomology	156	179		335	12.7
Others					
-Total Plant Protection	286	263		549	20.8%
Animal production	111	109		220	8.4
Animal Health	133	80		213	8.1
Marine Sciences/ Fisheries					
-Total	244	189		433	16.5%
-Mechanization	7	21		28	1.1%
-Agricultural Economics	25	76		101	3.8%
Soils	113	111		224	8.5
Water Resources	14	30		44	1.7
Irrigation	105	133		238	9.0
-Total	232	274		506	19.2%
-Central Support Services	—	—	—	—	—
-Others-Desert Research	64	58		122	4.6
-Botany	51	29		80	3.0
-Statistics	8	5		13	0.5
-Lab Analysis	42	32		74	2.8
-Land Survey	4	5		9	0.3
Grand totals	1318	1316	555	2634+(555)=3189	

*-AGRICULTURAL RESEARCH CENTER IN GIZA/MINISTRY OF AGRICULTURE AND FOOD SECURITY.
-UNIT OF AGRICULTURAL AND BIOLOGICAL RESEARCH, NATIONAL RESEARCH CENTER, ACADAMY OF SCIENTIFIC RESEARCH AND TECHNOLOGY/MINISTRY OF SCIENTIFICE RESEARCH.
-IRRIGATION RESEARCH CENTER/ MINISTRY OF IRRIGATION.
-DESERT RESEARCH CENTER/MINISTRT OF AGRICULTURAL REFORM.

Annex(9.2) -Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Iraq
- Year/Notes: 1984
- Institutions(a): 1-Center of Agricultural Research and Water Resources/ Scientific Research Council
  2-Hayia of Applied Agricultural Research/Ministry of Agriculture
  - Soil Res.and Land Rec.Center,Public Authority for Res.&Design/Ministry of Irrigat

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops	19	62		81	17.3
Fruits and vegetables	18	48		66	14.1
Others-Seed Production	3	14		17	3.6
-Plams	11	14		25	5.3
-Total Plant Production	51	138		189	40.4%
Plant Diseases					
Entomology					
Others					
-Total Plant Protection	10	51		61	13.0%
Animal Production	17	28		45	9.6
Animal Health	-	-		-	-
Marine Sciences/ Fisheries	-	-		-	-
- Total	17	28		45	9.6%
-Mechanization	2	16		18	3.8%
-Agricultural Economics	2	9		11	2.4%
Soils	22	26		48	10.2
Water Resources	13	20		33	7.1
Irrigation	13	44		57	12.2
- Total	48	90		138	29.5%
-Central Support Services					
-Others-Forages	1	5		6	1.3%
Grand totals	131	337	225	468+(225)=693	

Annex(9.3) -Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Jordan
- Year/Notes: 1985
- Institutions(s): -Department of Projects, Division of Agricultural Research/Ministry of Agriculture

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops	2	3		5	16.1
Fruits and vegetables	1	3		4	12.9
Others					
-Total Plant Production	3	6		9	29.0%
Plant Diseases	2	2		4	12.9
Entomology	2	2		4	12.9
Others					
-Total Plant Protection	4	4		8	25.8%
Animal Production and Health:	1	2		3	9.7
Marine Sciences/ Fisheries	-	-		-	-
- Total	1	2		3	9.7%
-Mechanization	-	-		-	-
-Agricultural Economics	2	2		4	12.9%
Soils					
Water Resources					
Irrigation					
- Total	2	2		4	12.9%
-Central Support Services					
-Others-Forages	-	2		2	6.5%
-Forestry	-	1		1	3.2%
Grand Totals	12	19	32	31+(32)=63	

Annex(9.4) -Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Lebanon
- Year/Notes: 1979
- Institutions(s): -Institute of Agricultural Research/Ministry of Agriculture

Field	Number of research workers				Per cen from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops Fruits and vegetables Others					
-Total Plant Production	4	6		10	43.5%
Plant Diseases Entomology Others					
-Total Plant Protection	-	1		1	4.4%
Animal Production Animal Health Marine Sciences/ Fisheries					
- Total	3	2		5	21.7%
-Mechanization	-	-		-	-
-Agricultural Economics	-	-		-	-
Soils Water Resources Irrigation					
- Total	1	6		7	30.4%
-Central Support Services -Others					
Grand Totals	8	15	28	23+(28)=51	

Annex(9.5) -Distribution of manpower working in agricultural research institution outside universities by field.

- Country:.....Kuwait..... - Year/Notes: ..1985...
- Institutions(s):-Kuwait Institute of Scientific Research..

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops Fruits and vegetables Others					
Total Plant Production					
Plant Diseases Entomology Others					
Total Plant Protection					
Animal Production Animal Health Marine Sciences/ Fisheries					
Total					
Mechanization					
Agricultural Economics					
Soils Water Resources Irrigation					
Total					
Central Support Services Others					
Grand Totals	18	14	48	32+(48)=80	

Annex(9.6) -Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Libya
- Year/Notes: 1984
- Institutions(s): Agricultural Research Center/National Authority of Scientific Research..

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops Fruits and vegetables Others					
Total Plant Production					
Plant Diseases Entomology Others					
Total Plant Protection					
Animal Production Animal Health Marine Sciences/ Fisheries					
Total					
Mechanization					
Agricultural Economics					
Soils Water Resources Irrigation					
Total					
Central Support Services Others					
Grand Totals	27	60	78	87+(78)=165	

Annex(9.7)-Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Morocco - Year/Notes: 1984
- Institutions(s): National Institute of Agricultural Research/Ministry of Agriculture

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops	-	18		18	19.8
Fruits and vegetables	-	19		19	20.9
Others	-	1		1	1.1
-Total Plant Production	1	38		38	41.8%
Plant Diseases	1	13		14	15.4
Entomology	-	4		4	4.4
Others					
-Total Plant Protection	1	17		18	19.8
Animal Production	-	7		7	7.7
Animal Health	-	1		1	1.1
Marine Sciences/ Fisheries	-	-		-	-
- Total	-	8		8	8.8
-Mechanization	-	-		-	-
-Agricultural Economics	-	2		2	2.2
Soils Water Resources Irrigation					
- Total	1	11		12	13.2
-Central Support Services					
-Others-Food Tech.+	-	3		3	3.3
Nutrition-Climatology	-	3		3	3.3
-Forages	-	-		-	-
-Statistics	-	2		2	2.2
-Chemistry	-	3		3	3.3
-Microbiology	-	2		2	2.2
Grand Totals	2	89	80	91+(80)=171	

Annex(9.8) -Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Oman
- Year/Notes: 1984
- Institutions(s): -Department of Agricultural Research/Ministry of Agriculture and Fisheries

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops Fruits and vegetables Others					
- Total Plant Production	2	4		6	54.5%
Plant Diseases Entomology Others					
- Total Plant Protection	1	2		3	27.3%
Animal Production	-	-		-	-
Animal Health	-	-		-	-
Marine Sciences/ Fisheries	-	2		2	18.2
- Total	-	2		2	18.2%
- Mechanization					
- Agricultural Economics					
Soils Water Resources Irrigation					
- Total					
- Central Support Services - Others					
Grand Totals	3	8	12	11+(12)=23	

Annex(9.9)-Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Qatar
- Year/Notes: 1984
- Institutions(s): Department of Agricultural Research/Ministry of Agriculture and Industry

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops Fruits and vegetables Others					
- Total Plant Production					
Plant Diseases Entomology Others					
- Total Plant Protection					
Animal Production Animal Health Marine Sciences/ Fisheries					
- Total					
- Mechanization					
- Agricultural Economics					
Soils Water Resources Irrigation					
- Total					
- Central Support Services - Others					
Grand Totals	3	6	8	9+(8)=17	

Annex(9.10) -Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Saudi Arabia - Year/Notes: 1985
- Institutions(s): 1-Regional Center of Agriculture and Water Research/Ministry of Agriculture 2-Agricultural Research Centers in the Ministry of Agriculture and Water

Field	Number of research workers				Per cent from total (A)
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops	-	-		-	-
Fruits and vegetables	2	2		4	10
Others	4	1		5	12.5
- Total Plant Production	6	3		9	22.5%
Plant Diseases	1	1		2	5
Entomology	1	2		3	7.5
Others					
- Total Plant Protection	2	3		5	12.5%
Animal Production	1	1		2	5
Animal Health	2	-		2	5
Marine Sciences/ Fisheries					
- Total	3	1		4	10%
- Mechanization					
- Agricultural Economics					
Soils					
Water Resources					
Irrigation					
- Total	3	6		9	22.5%
- Central Support Services					
- Others-Food Technology and Nutrition	4	3		7	17.5
-Chemistry	3	3		6	15
Grand Totals	21+ 40*=61	19+ 20*=39	38+ 58*=96	40+(38)=78 100+(96)=196**	

*Number of research workers in the Agricultural Research of the MOA, not divided into disciplens

**Total including workers in the Agricultural Research Centers of the MOA, not divided into disciplens

(A)-% total of those in the Regional Center of Agriculture and Water Research

Annex(9.11) -Distribution of manpower working in agricultural research institution outside universities by field.

- Country:.....Somalia..... - Year/Notes: .1984....
- Institutions(s):-Agricultural Research Center/Ministry of Agriculture

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops Fruits and vegetables Others					
Total Plant Production	2	3		5	35.7%
Plant Diseases Entomology Others					
Total Plant Protection	1	1		2	14.3%
Animal Production Animal Health Marine Sciences/ Fisheries					
Total	2	1		3	21.4%
Mechanization					
Agricultural Economics					
Soils Water Resources Irrigation					
Total	1	3		4	28.6%
Central Support Services Others					
Grand Totals	6	8	11	14+(11)=25	

Annex(9.12)-Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Sudan - Year/Notes: 1984
- Institutions(s): Agricultural Research Authority/Ministry of Agriculture.

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops	27	11		38	20.0
Fruits and vegetables	26	11		37	19.5
Others(Cotton,Sugar Cane)ground nuts	8	-		8	4.2
Total Plant Production	61	22		83	43.7%
Plant Diseases	9	2		11	5.8
Entomology	18	6		24	12.6
Others					
Totalt Plant Protection	27	8		35	18.4%
Animal Production and Animal Health	3	7		10	5.3
Marine Sciences/ Fisheries	1	1		2	1.1
Total	4	8		12	6.3%
Mechanization	-	4		4	2.1%
Agricultural Economics	3	3		6	3.2%
Soils Water Resources Irrigation					
Total	13	1		14	7.4%
Central Support Services					
Others-Food Technology	15	8		23	12.1%
-Applied Sciences	8	5		13	6.8%
Grand Totals	131	59	79	190+(79)=269	

Annex(9.13) -Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Syria
- Year/Notes: 1984..
- Institutions(s): -Department of Research/Ministry of Agriculture and Agricultural Reform

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops	5	10		15	27.8
Fruits and vegetables	5	3		8	14.8
Others					
Total Plant Production	10	13		23	42.6%
Plant Diseases					
Entomology					
Others					
Total Plant Protection	6	6		12	22.2%
Animal Production	1	2		3	5.6
Animal Health	-	3		3	5.6
Marine Sciences/ Fisheries					
Total	1	5		6	11.1%
Mechanization					
Agricultural Economics					
Soils					
Water Resources					
Irrigation					
Total	4	4		8	14.8%
Central Support Services					
Others-Forestry	1	1		2	3.7%
-Forages	-	2		2	3.7%
-Food Technology	-	1		1	1.9%
Grand Totals	22	32	142	54+(142)=196	

Annex(9.14)-Distribution of manpower working in agricultural research institution outside universities by field.

- Country:.....Tunisia.. - Year/Notes: 1983-1984 .....
- Institutions(s):-Centers and Institutes in the Minsitry of Agriculture..

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops	4	8		12	12.4
Fruits and vegetables	7	4		11	11.3
Others					
-Total Plant Production	11	12		23	23.7%
Plant Diseases					
Entomology					
Others					
-Total Plant Protection	4	7		11	11.3%
Animal Production					
Animal Health					
Marine Sciences/ Fisheries	3	11		14	14.4
- Total	3	11		14	14.4%
-Mechanization	-	1		1	1.0%
-Agricultural Economics	2	6		8	8.3%
Soils	2	7		9	9.3
Water Resources Irrigation	1	3		4	4.1
- Total	5	17		22	21.7%
-Central Support Services					
-Others-Forestry	-	1		1	1.0%
-Forages	-	1		1	1.0%
-Climatology	1	5		6	6.2%
-Pure Sciences	2	9		11	11.3%
Grand Totals	27	70	(38)	97+(38)=135	

-National Institute of Agricultural Research
-National Institute of Forestry
-National Institute of Marine Sciences and Fisheries
-Soil Division
-Research Center of Rural Development
-Institute of Olive Research

Annex(9.15)-Distribution of manpower working in agricultural research institution outside universities by field.

- Country: UA Emirates - Year/Notes: 1984
- Institutions(s): -Department of Agricultural Research/Minsitry of Agriculture, Abu-Dhabi

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops Fruits and vegetables Others					
Total Pant Production					
Plant Diseases Entomology Others					
Total Plant Protection					
Animal Production Animal Health Marine Sciences/ Fisheries					
Total					
Mechanization Agricultural Economics Soils Water Resources Irrigation					
Total					
Centrl Support Services Others					
Grand Totals	3	4	5	7+(5)=12	

Annex(9.16)-Distribution of manpower working in agricultural research institution outside universities by field.

- Country:.....Yemen AR..... - Year/Notes: .1984-85...
- Institutions(s):-Agricultural Research Authority/Ministry of Agriculture +Fisheries .....

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops Fruits and vegetables Others					
-Total Plant Production	7	11		18	43.9%
Plant Diseases Entomology Others					
-Total Plant Protection	5	6		11	26.8%
Animal Production Animal Health Marine Sciences/ Fisheries					
- Total	-	-		-	-%
-Mechanization	-	3		3	7.3%
-Agricultural Economics	-	1		1	2.4%
Soils Water Resources Irrigation					
- Total	4	4		8	19.5%
-Central Support Services -Others					
Grand Totals	16	25	29	41+(29)=70	

Annex(9.17)-Distribution of manpower working in agricultural research institution outside universities by field.

- Country: Yemen Dem. - Year/Notes: 1985
- Institutions(s): Department of Agricultural Research and Extention/ Ministry of Agriculture and Agricultural Reform

Field	Number of research workers				Per cent from total
	Ph.D	M Sc.	B Sc.	Total per field	
Field Crops	2	9		11	20.4
Fruits and vegetables	1	6		7	13.0
Others					
- Total Plant Production	3	15		18	33.3%
Plant Diseases	5	3		8	14.8
Entomology	-	5		5	9.3
Others					
- Total Plant Protection	5	8		13	24.1%
Animal Production					
Animal Health					
Marine Sciences/ Fisheries					
- Total	-	-		-	-
- Mechanization	2	2		4	7.4%
- Agricultural Economics	-	2		2	3.7%
Soils					
Water Resources					
Irrigation					
- Total	2	9		11	20.4%
- Central Support Services					
- Others-Food Technology	-	2		2	3.7%
-Forestry	-	4		4	7.4%
Grand Totals	12	42	32	54+(32)=86	

-REFERENCES-

1- Abu-Zeineh, Farid,1986.Scientific Manpower Working in the Arab Countries (a review of number, qualification,nationality and field of study of manpower working in and outside Arab universities). A paper presented to the Committee for Arab Scientific Strategy. Damascus-Syria.

2- Agricultural Research Corporation, 1981. Agricultural Research Programmes, ARC, Wad Medani, Ministry of Agriculture,Food and Natural Resources. Khartoum-Sudan.

3- Agricultural Research Center, 1984. Five Year Plan of Agricultural Research 1982-1987.Ministry of Agriculture.Giza-Egypt.

4- Agricultural Research Center,1984.The Agriculture Research Center, 1898-1983, Ministry of Agriculture.Giza-Egypt.

5- Agricultural Research Center,1985.Programs and Manpower,National People Office for Agriculture.Tripoli-Libyan Jamahirya.

6- Agricultural Research Organization,1985.Structure,Programs and Manpower, Ministry of Agriculture and Agricultural Reform.Aden-People's Domocratic Republic of Yemen.

7- Agricultural Research Authority (ARA),(1985).Annual Report for 1984.ARA,Ministry of Agriculture.Taiz-Yemen AR.

8- Authority for Applied Agricultural Research,1984.Research Plan for 1983, Ministry of Agriculture and Agricultural Reform.Baghdad-Iraq.

9- Center of Agricultural Research and Water Resources,1984.Structure, Programs and Manpower,Scientific Research Council. Baghdad-Iraq.

10- Centre National De Documentation Agricole,1986.The Recherche En Cours, Agriculture et Sciences Associees, Programmes,Chercheurs Institutions. Ministere De L'Agriculture.Republique Tunisienne.

11- Kuwait Institute for Scientific Research,1985.Research Program, Highlights and Manpower.Safat-Kuwait.

12- Ministere De L'Enseignment Superieur,1985. Annual Report 1984-85. Direction De La Planification.Republique Algerienne Democratique et Populaire.

13- National Ministry of Education, 1985.King Hassan Institute for Agricultural and Veterinary Sciences (taken from the book:Higher Education in Morocco). Rabat-Morocco(in Arabic).

14- National Authority of Scientific Research,1985.Annual Report of 1984.Tripoli-Libyan Jamahirya.

15- Qasem-Subhi,1982.Analytical Review of Food Problem in Arab Countries. Abdul-Hameed Shoman Foundation.Amman-Jordan.(in Arabic).

16- Qasem-Subhi,1985.Agricultural Research and Extension.(in the book entitled:The Agricultural Sector of Jordan,Policy and Systems Studies A.B.Zablan-editor,Subhi Qasem-team leader)Ithaco Press, London.

17- Regional Center of Agriculture and Water Research,1985.Programs and Manpower, Ministry and Agriculture and Water.Riyad - Saudi-Arabia.